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ABSTRACT

The proceedings of the annual conference of the North East Association for Institutional Research, whose theme was "Planning for Quality," are presented. The 26 papers were divided into the following topics: admissions, assessment, enrollment, faculty and staff, outcomes, planning, programs and retention, the environment, and the field of institutional research. Among them are: "Analyzing the Inquiry Pool to Develop Positioning Strategies: Application to Two Universities" (Robert S. Lay and David W. Bradley); "An Approach to Studying Student Preference of College and Future Enrollments" (Glenwood Rowse); "COMP As a Measure of Educational Impact" (Kendy Maccoll Rudy); "The Effects of Skills Measures on Student Retention" (Frank Rusciano); "An Experiment in Using ACT-COMP" (Lois Torrence); "A Computer Model for Long Range Enrollment Planning" (David Bradley, Peter Farago, and Carolyn Shettle); "Enrollment Projections: A Model for the Regional Public Institution with a Non-traditional Student Population" (Robert M. Karp); "Estimating Fall Enrollments and FTE's Using a Student Flow Model" (Louis Spiro); "A Model for Projecting Tenure Density at the Institutional Level" (Christos Theophilides); "Career Maturity, Locus of Control, and Job-Seeking Behavior in the Initial Employment of College Graduates" (Kathleen Day Hulbert); "The Role and Scope of Institutional Research in the State University Planning and Budgeting" (Thomas Freeman and Kathleen Kopf); "Cross-Impact Matrix Approach for the Generation of Academic Planning Models" (Edward Jordan); "Degree Patterns--An Indicator of Institutional and State Responsiveness" (Donald Hester); "Reaganomics and Research" (John P. Joyce and Beverly A. Joyce); "Institutional Research and Accreditation at the Defense Intelligence School" (Hugo A. Keesing); "Institutional Research Without a Computer--Student Characteristics: Collection, Assimilation, and Application" (Kathleen O'Reilly); and "Institution-Based Interinstitutional Research: Boon or Burden" (Dwight Wolf). (LC)

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PLANNING FOR QUALITY

Papers from the Eighth Annual Meeting
of the
North East Association for Institutional Research

Henry Chauncey Conference Center
PRINCETON, NEW JERSEY
November 5-7, 1981

PREFACE

The Eighth Annual Conference of the North East Association for Institutional Research was held November 5 - November 7, 1981, at the Henry Chauncey Conference Center, Princeton, New Jersey. The conference theme, "Planning for Quality" drew a record number of 154 participants.

The professional development workshop on Critical Issues in Questionnaire Design was attended by 60 interested institutional researchers. Demonstrations on word processing and microcomputers also preceded the formal conference address, delivered by Thomas Green of Syracuse University, who tackled the difficult issue of Concepts of Educational Quality.

The various concurrent sessions on Friday and Saturday morning covered a diversity of topics, including enrollment projections, computer modelling, student outcomes, retention, transfer articulation, and the merger of planning and budgeting. An excellent symposium, entitled Moving Beyond Planning Based on Extrapolation in an Era of Radical Change, filled the West Wing Meeting Room, with standing room only.

The Association is grateful to Nancy Neville, (Rochester Institute of Technology) for chairing the Conference Program Committee. She was ably assisted by Bob Lay (Boston College) who coordinated the pre-conference workshop, led by Sid Micek (Syracuse University). The success of the conference was also due to the indefatigable efforts of Carl Feigenbaum (Monmouth College) and Ed Delaney (Kean College of New Jersey) who co-chaired the Local Arrangements Committee.

The papers included in the Proceedings are those submitted for publication and do not cover all the presentations made at the conference. Apreciation is due all who contributed their time as moderators, presenters, and panelists.

The final form of Proceedings is thanks to the efforts of Marjorie Raab and Professor Anne P. Christian, Nassau Community College, and Helen Rock, State University of New York at Plattsburgh.

Diana M. Green, NEAIR Publications Chair

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ANALYZING THE INQUIRY POOL TO DEVELOP POSITIONING STRATEGIES: APPLICATION TO TWO UNIVERSITIES

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INTRODUCTION

The application of current marketing approaches to college admissions planning has gained wider acceptance over the last several years. Academic marketing can be defined as the matching of prospective students' needs and preferences with institutional strengths. The early stages of the student chronology -- the transition from college prospect to matriculant -- correspond roughly with the steps of the consumer decision process. In the marketing literature this process is described, in its simplest form, as proceeding from awareness to interest, from interest to decision, and from decision to action (see Figure 1). The correspondence is rough due to the arbitrary nature of the way institutions might define those stages and because of differing decision processes among students themselves.

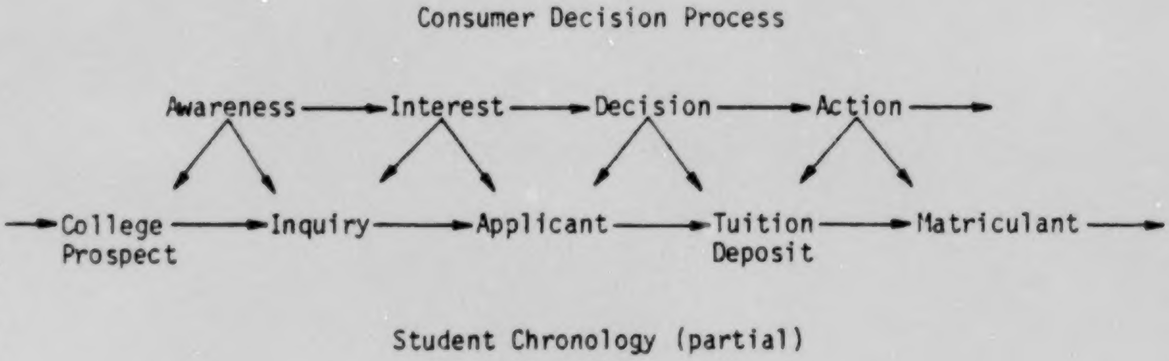

Consumer Decision Process
Awareness
Interest
Decision
Action
College Prospect
Inquiry
Applicant
Tuition Deposit
Matriculant
Student Chronology (partial)

Figure 1.

While many institutions have made significant progress by concentrating on the transition from applicant to matriculant, relatively few have successfully studied the dynamics of their inquiry pools.[1] Because prospects in the inquiry pool may be more open to an improved match with an institution, several substantive issues might be addressed: 1. lack of awareness, 2. misperception, and 3. unrealistic objectives (either too broad or too confining). For the academic marketer, this is an area of study that can have significant implications for institutional policies and procedures. Boston College and Boston University make interesting comparative cases due to their obvious similarities but more importantly because of subtle differences both in their perceived institutional identities and in their developed marketing strategies. After experiencing financial difficulties in the late 1960's and the early 1970's, each institution acknowledged the need to revitalize undergraduate admissions. While Boston College chose to focus on strengthening primary geographical markets, Boston University has put greater emphasis on developing a broader geographical base. Both schools have enjoyed successes in pursuing their respective strategies.

At Boston College, out of approximately 50,000 freshman admissions inquiries about 25% apply for a position in an entering class of less than 2,000. At Boston University, the inquiry pool approaches 130,000, of which 13% apply for an entering class of about 3,600. Because over 35,000 inquiries at Boston College and over 100,000 inquiries at Boston University choose not to apply, both schools have now converged in their interest to assess their present images and competitive positions among their inquiry markets and to further evaluate their ongoing promotion and recruitment efforts. We propose in this paper to present a methodology for measuring differences in image (among geographic markets) and in the factors which influence competitive position.

METHODOLOGY

Data Sources

Boston College data are from a questionnaire mailed in early summer 1981 to a six percent sample of nonapplicants (out of 1,963 mailed, 583 were returned for a response rate of 30%) and to a 50 percent sample of accepted applicants (out of 2,133 mailed, 1,583 were returned for a response rate of 74%). Responses of nonapplicants and accepted applicants were weighted to reflect their correct proportions in the inquiry pool. Small response biases by gender and by geography were deemed within acceptable ranges.

A number of parallel items were included from the Boston University questionnaire -- the result of collaborating in the design of these studies of inquiries. Because the Boston College study was administered after admissions decisions had been made, it was possible to focus on the contrast between accepted applicants (excluding applicants who did not meet Boston College's admissions standards) and nonapplicants (who were able to report the colleges that accepted them and to identify the college they therefore planned to attend). The disadvantage, however, is that respondents may tend to rationalize their college decisions to some extent.

Boston University conducted a similar study in February/March, 1981, to obtain information before the respondent had received notification of acceptance but after most applications had been filed. It was surmised that evaluations at this point in time would contain less bias and be more indicative of the awareness/interest stage of the consumer process.

A random sample representative of the entire freshman inquiry population was constructed in a systematic fashion. The 4,887 original sample members yielded 2,047 usable questionnaires; a response rate of 42%. As was expected, the final sample was overrepresenting Boston University applicants, and the ensuing analyses have been weighted to reflect the true application rate when projecting to the complete inquiry pool.

The studies were similar enough in design and measurement techniques that useful comparisons of image and position could be drawn. Both surveys included a question on the general image the respondent held of the school and both used a bipolar adjective scale to measure the evaluation of attributes for colleges of interest. It should be noted, however, that the differences in timing and sample populations of the two studies introduce elements of bias.

Analytical Methods

The measurement of image was achieved by means of an exploratory open-ended question designed to elicit the first word or phrase that came to mind when hearing the name of the school. Identical coding categories were established to facilitate comparisons between schools. The data were analyzed by two and three-way contingency tables.

An analysis of the factors which influence competitive position was accomplished by factor analyzing ratings of attributes of the colleges of attendance. Factor scores were computed for each respondent and added back to the survey data bases so that mean standardized factor scores for the top competing colleges and universities could be computed for non-applying inquiries. A graphical display of relative competitive position on selected factor dimensions was constructed by plotting the mean factor scores on standardized axes. A cutoff of one or more eigenvalues was used in constructing factor solutions. The reader should be advised that these perceptual maps relate competitors within specific inquiry populations and are not generalizable beyond the markets of Boston College and Boston University.

INTERPRETATION OF IMAGE ANALYSES

Separately for the Boston College and Boston University samples, Table 1 displays the top eight categories of response to the "image" question (see table-note 1). By adding the percentages in the right hand column it can be seen that 83 percent of all Boston College responses and 90 percent of all Boston University responses may be accounted for by the eight categories. Respondents most often (27%/30%) gave a word or phrase that denoted "prestige" (such as "excellent reputation" or "great school"). Prestige clearly is a desirable element of the image the universities want to project. The geographical variations in the prestige categories again reflect the differing marketing strategies of the two universities. While Boston College's local image has a distinct athletic component, its overall image is primarily one of Prestige, Boston/Urban and Jesuit/Catholic.

Boston University's image is predominantly similar to Boston College's, with the singular identity of Jesuit/Catholic being replaced by a more general image of a larger, more urban school. Also evident for Boston University is its broader geographical diversity. Data for both schools reflect the appeal that New England has for students outside of the Northeast.

Table 1

Image and Geography: Category Percentages by geographical area[1]

School: Word Category	Metro Boston	Other New England	Other Northeast	Other U.S.	All
	Geography				
Boston College:					
1. Prestige	21	32	31	24	27
2. Boston/Urban	8	17	11	19	14
3. Jesuit/Catholic	13	16	13	9	13
4. Academics	10	6	9	9	10
5. Athletics	20	8	3	4	9
6. Social	5	6	6	4	5
7. New England	3	0	2	11	3
8. University/Large	1	1	3	1	2
All	25	21	36	18	
Boston University:					
1. Prestige	28	21	32	31	30
2. Boston/Urban	20	31	27	25	26
3. Large University	21	23	12	7	12
4. New England	1	1	3	9	5
5. Expensive	9	6	4	5	5
6. Academics	2	3	6	5	5
7. Specific Coll/Prog	4	3	4	6	5
8. Athletics	6	2	2	1	2
All	9	14	31	46	

---

[1] Responses to the questions: When you hear the name Boston College, what word or phrase first comes to mind? Or when you hear the name Boston University, what single word or phrase comes to mind?

Table 2

Accepted Applicant Yields and Geography[1]

School: Word Category	Metro Boston	Other New England	Other Northeast	Other U.S.	All
	Geography				
Boston College:					
1. Prestige	22	13	6	7	11
2. Boston/Urban	10	11	9	6	9
3. Jesuit/Catholic	12	8	8	5	11
4. Academics	21	22	13	8	16
5. Athletics	13	17	8	3	12
6. Social	17	14	11	10	13
7. New England	2	-	8	3	4
8. University/Large	12	25	2	2	6
All	15	13	7	5	10
Boston University:					
1. Prestige	22	23	19	6	13
2. Boston/Urban	32	10	13	5	10
3. Large University	11	6	11	2	7
4. New England	0	41	2	4	4
5. Expensive	6	0	4	2	3
6. Academics	34	6	29	8	16
7. Specific Coll/Prog	57	44	23	5	18
8. Athletics	9	19	6	15	10
All	21	12	15	5	11

---

[1] Accepted Applicant Yield = (# accepted applicants/(non-applicants + accepted applicants)) x 100. The Boston University sample includes rejected applicants in the denominator. Due to the timing of the Boston University survey, respondents were asked to identify schools to which they "thought" they would be accepted.

By examining the accepted applicant yields in Table 2, one can estimate the effect each image may have on the likelihood of qualified students applying. In spite of the differences between each university's marketing strategies, yields generally decline with distance from Boston. Keeping in mind that Prestige was identified as a key dimension of image, note the interesting patterns in yields for each school. Prestige has an equally beneficial effect in Metro Boston, yet makes a greater contribution to Boston University's accepted applicant yield outside of the local area. Note that the image of Prestige does not appear to be differentially beneficial outside the Northeast.

The two universities also experience different reactions to their Boston locations. Boston University's urban setting and Boston College's suburban setting cause the pattern of yields to vary markedly within the Metro Boston market. Because of clear differences in yield by image category among geographical markets, each university may wish to consider tailoring its marketing planning activities by addressing these variations.

INTERPRETATION OF FACTORS THAT INFLUENCE COMPETITIVE POSITION

By examining the individual attributes which load on each of the factors displayed in Table 3, one can draw conclusions about the way prospective students evaluate their college choices at this stage of the decision process. Despite the fact that each university employed slightly different sets of attributes, the first four factors in each solution measure roughly the same dimensions. This is evidence for both the comparability and the validity of each analysis.

Table 3

Attributes that Load Highly on Rotated Factors (in Rank Order)

	Factors				
	1	2	3	4	5
Boston College	"Academic Reputation"	"Courses/Programs"	"Religious/Social"	"Campus/Location"	"Net Cost"
	+ Teaching Reputation + College Faculty + Quality of Students + General Reputation + Employment Opportunities After Graduation	+ Variety of Courses + Specific Academic Programs	+ Religious Opportunities + Diversity of Student Body + Athletic Facilities + Social Activities	+ Attractiveness of Campus + Location of Campus	+ Expected Cost After Financial Aid + Tuition, Room, and Board + Reputation of Financial Aid Program

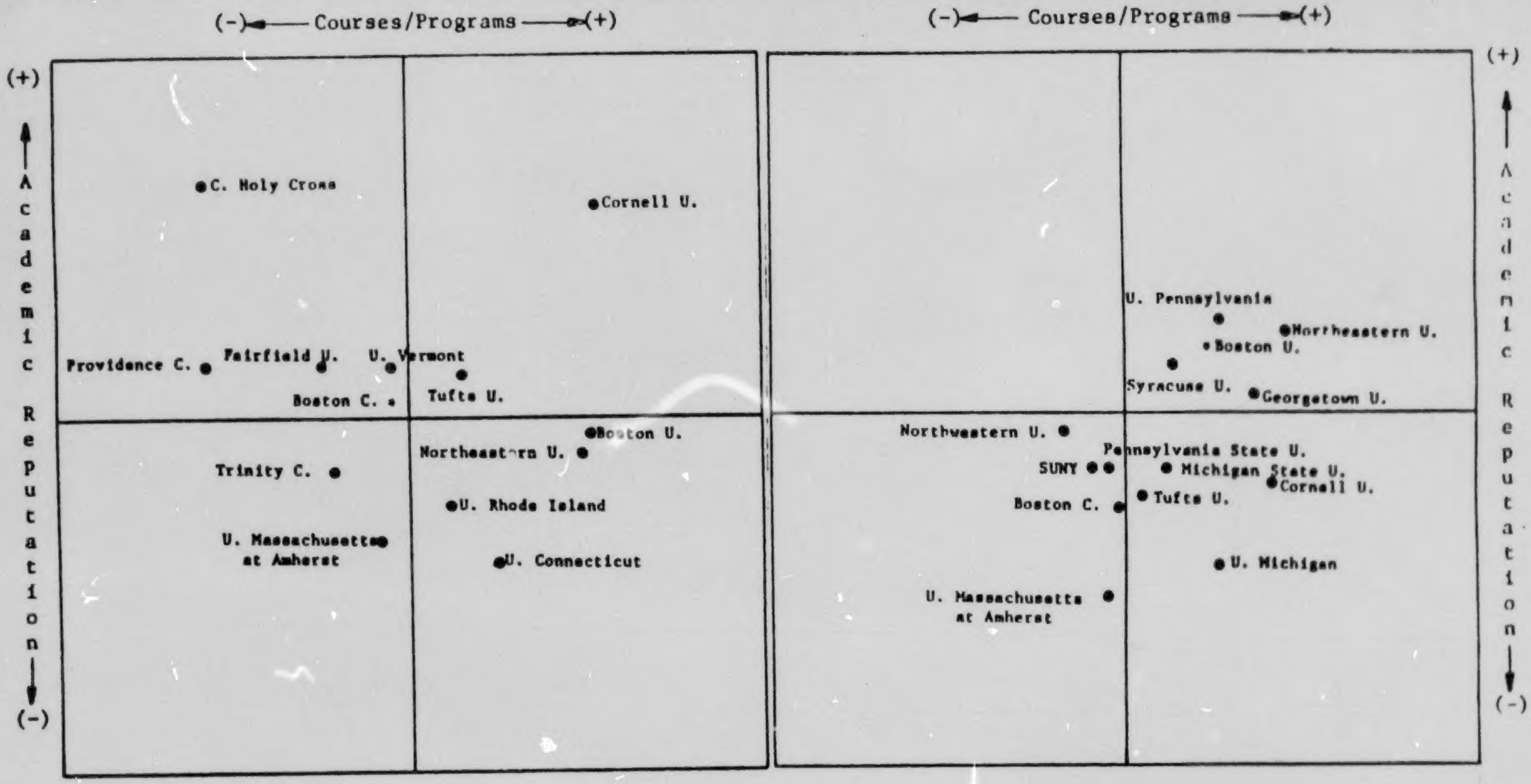
	Factors				
	1	2	3	4	5
Boston University	"Academic Reputation"	"Courses/Programs"	"Collegiality/Social"	"Environmental"	"Student Support Services"
	+ Academic Reputation + Quality of Faculty + Strength of Department + Availability of Faculty (-) Cost	+ Majors Offered + Academic Diversity + Strength of Department + Availability of Faculty + Cultural Opportunity	+ Attitude of Students + General Atmosphere + Social Life + Availability of Faculty	+ Environment + Geographic Location + Appearance of Campus + General Atmosphere + Size	+ Placement (Career) + Availability of Faculty + Cultural Opportunities + Availability of Financial Aid + Strength of Department

Note: Results of two separate principle factor solutions after varimax rotations. Analyses were performed on ratings of attributes for schools of attendance within Boston College's and Boston University's total inquiry pools. Boston College's sample excludes rejected applicants. The lists of attributes being rated were not identical for the two schools. Factor labels and rotated factor matrix coefficient cutoffs for inclusion in this table were arbitrarily chosen by the authors.

Figures 2a through 4b illustrate how the above factor dimensions can be selected two at a time to plot the positions of top competitors for nonapplicants. For reference, the positions of Boston College and Boston University are also plotted (using ratings by inquirers who attended). By examining these graphs, the advantage among competitors that were able to enroll each school's nonapplicants may be appreciated.

An assumption that will guide our interpretation of these maps is that schools positioned closely to one another are likely to experience greater competition for nonapplicants. Another assumption is that these perceptual maps are merely illustrative of one way of assessing competitive position, and that a fuller assessment would extend this analysis to other competitors and to other phases of the student chronology.

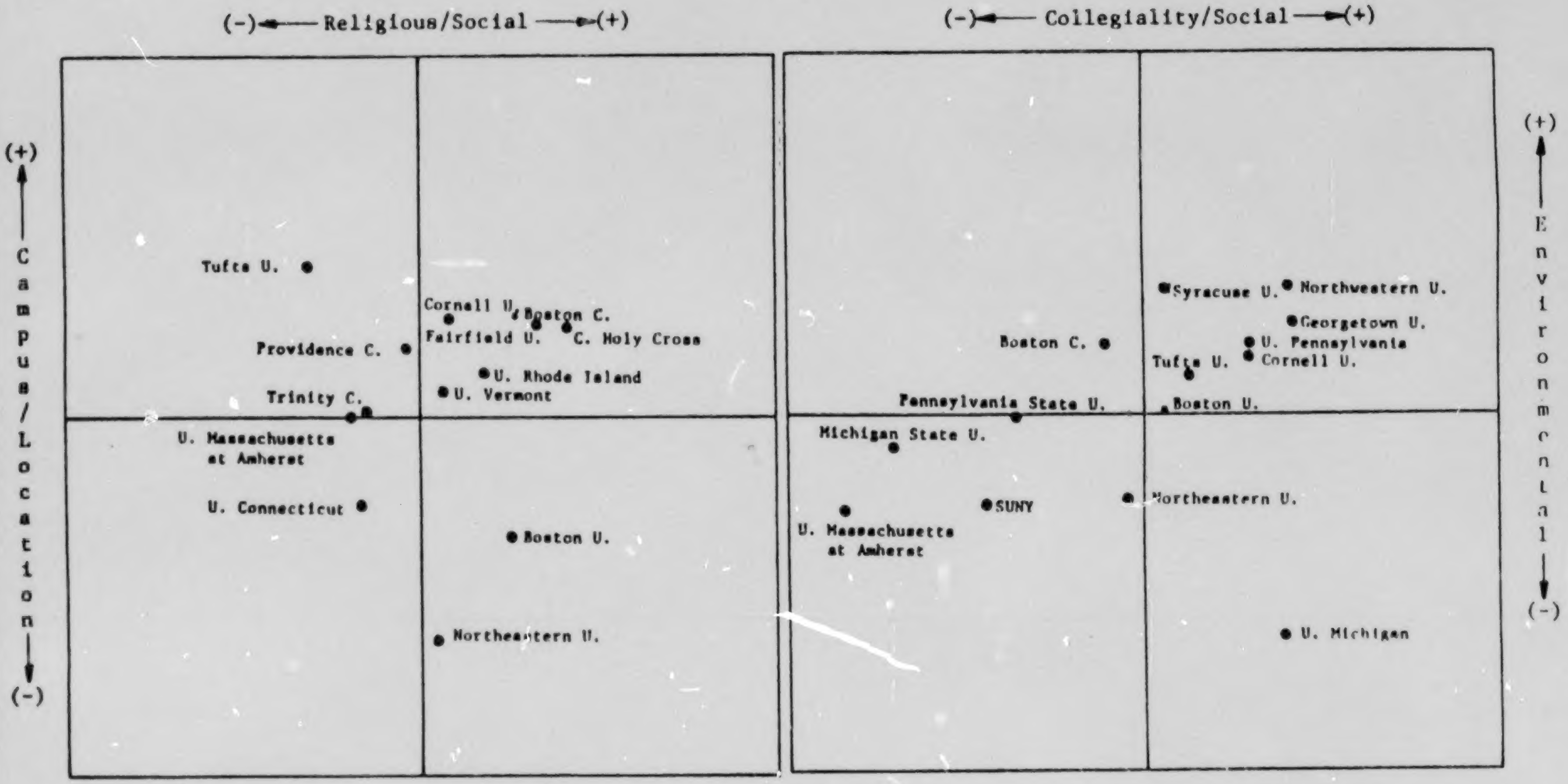
In Figures 2a through 4a, Boston College clusters respectively with the University of Vermont, Fairfield University and Tufts University, reflecting the interplay of the five factor dimensions. Further study on each competitor can yield very important information about why Boston College is losing nonapplicants to these schools, with the hope that there is potential for Boston College's improvement. For example, the University of Vermont holds a significant advantage over Boston College on only one of the five dimensions: Net Cost. Because the University of Vermont is a state institution, we may speculate that relative perceived tuition levels might be discouraging some prospective applicants who would have been eligible for significant amounts of financial aid. An integrated admissions/financial aid program could be organized to address this concern, if the above speculation is found to apply to state institutions in general.



2a-Boston College

2b-Boston University

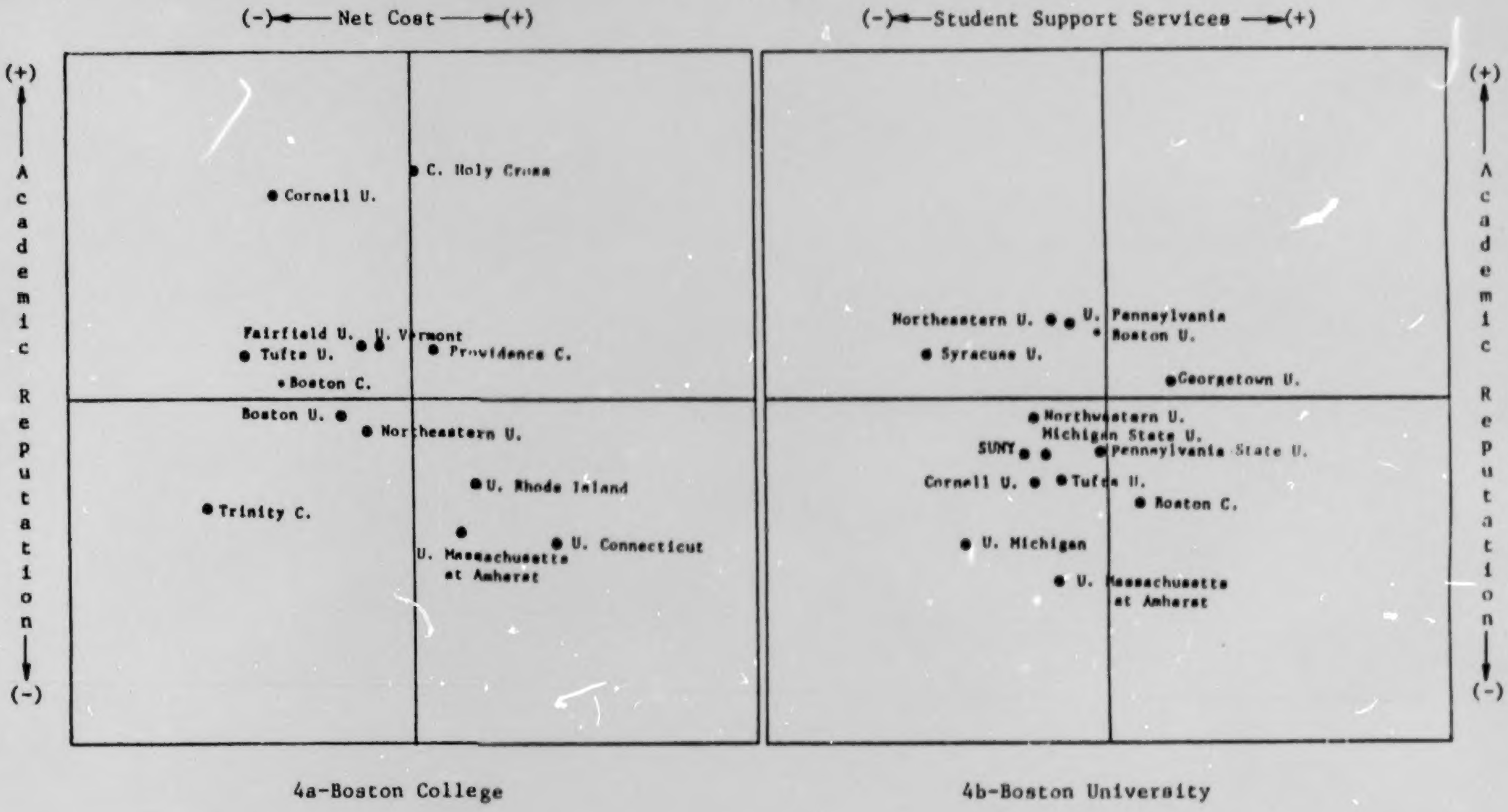
Figure 2. Perceptual Maps of Top Competitors for Nonapplicants



3a-Boston College

3b-Boston University

Figure 3. Perceptual Maps of Top Competitors for Nonapplicants



4a-Boston College

4b-Boston University

Figure 4. Perceptual Maps of Top Competitors for Nonapplicants

In Figures 2b through 4b, Boston University is positioned closely to somewhat different groups of competitors as the dimensions are changed. In terms of academic reputation Boston University is more closely associated with the University of Pennsylvania, Northwestern University, Georgetown University, Syracuse University and Northeastern University. The relative positions of the six schools change significantly when the Courses/Programs dimension is replaced by Student Support Services. When the dimensions of Environment and Collegiality/Social are used to plot positions the cluster dissolves somewhat, and a greater area of perceptual space is covered. This represents the possibility of greater opportunity to develop a unique positioning strategy in relation to these competitors.

A final illustration of how perceptual maps may be used is to draw a comparison between Figures 2a and 2b. The relative positions of Boston College and Boston University on the two maps indicate the effects differing inquiry populations and competitive structures will have on this type of analysis. Based on Figure 2a it would appear that Boston University outdraws Boston College along the dimension of Courses/Programs, whereas Figure 2b would indicate that Academic Reputation is the dimension that better explains the differences in position. To impute why Boston College outdraws Boston University, one would examine Figures 3a and 3b to note Boston College's advantage on the Campus/Location and Environmental dimensions respectively. The comparison between Boston College and Boston University should serve to illustrate the difficulties in comparing perceptual maps and to point out the wisdom of replicating and empirically grounding any findings by means of a more comprehensive treatment of student chronology and the consumer decision process.

IMPLICATIONS

The results of this type of analysis allow the academic marketer to address several opportunities to more effectively stimulate awareness of and interest in what their respective institutions can offer. By recognizing these opportunities, one may better plan promotional and recruitment efforts for the early stages of student chronology. These early efforts might consist of:

1. redefinition of existing markets,
2. further development of existing markets,
3. selective development of new markets,
4. clarification of institutional strengths and weaknesses to optimally manage image,
5. greater emphasis on the benefits relevant to specific markets,
6. and in the extreme case, redefinition of the institution's mission.

Although the findings we have discussed are not generalizable, the methods and procedures can be useful in enrollment management strategies at other institutions. Our discussion of consumer behavior barely scratches the surface of the literature, and there remains significant potential to incorporate existing behavioral models into college and university marketing planning. The application of these theories and techniques requires a rigorous analytical approach, but more importantly, requires creative evaluation and implementation programs.

Reference Note

1 Baker, Michael and Ami Meganathan. Why They Didn't Apply. Unpublished paper of the Planning Department of Carnegie-Mellon University, 1979.

AN APPROACH TO STUDYING STUDENT PREFERENCE OF COLLEGE & FUTURE ENROLLMENTS

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There are many approaches to and levels of analyzing an institution's market for students. It is certainly useful to know the probability that a given type of applicant will be influenced by certain institutional attributes and marketing strategies. It is also useful to know the mix of students at one's institution (Probability of X given Y), but it is quite a different and equally useful thing to know the proportion of a given type of student that is interested in your type of institution (probability of Y given X), and the kinds of high schools that are the best recruitment targets.

Substantial increases or decreases projected for one's typical student pool can easily overshadow marginal competitive concerns and require substantial adaptations by an institution. At a central agency level, the distribution of attendance patterns for a given type of student indicates either the level of access and choice available to, or the programs interests of that type of student (See Figure 1 for a distribution of students classified only by geography). Policy questions in all of these areas are dependent on the presence of useful student preference or choice knowledge and adequate demographic projections.

FIGURE 1: NEW YORK STATE

FULL-TIME FIRST TIME STUDENTS

Origin of Students

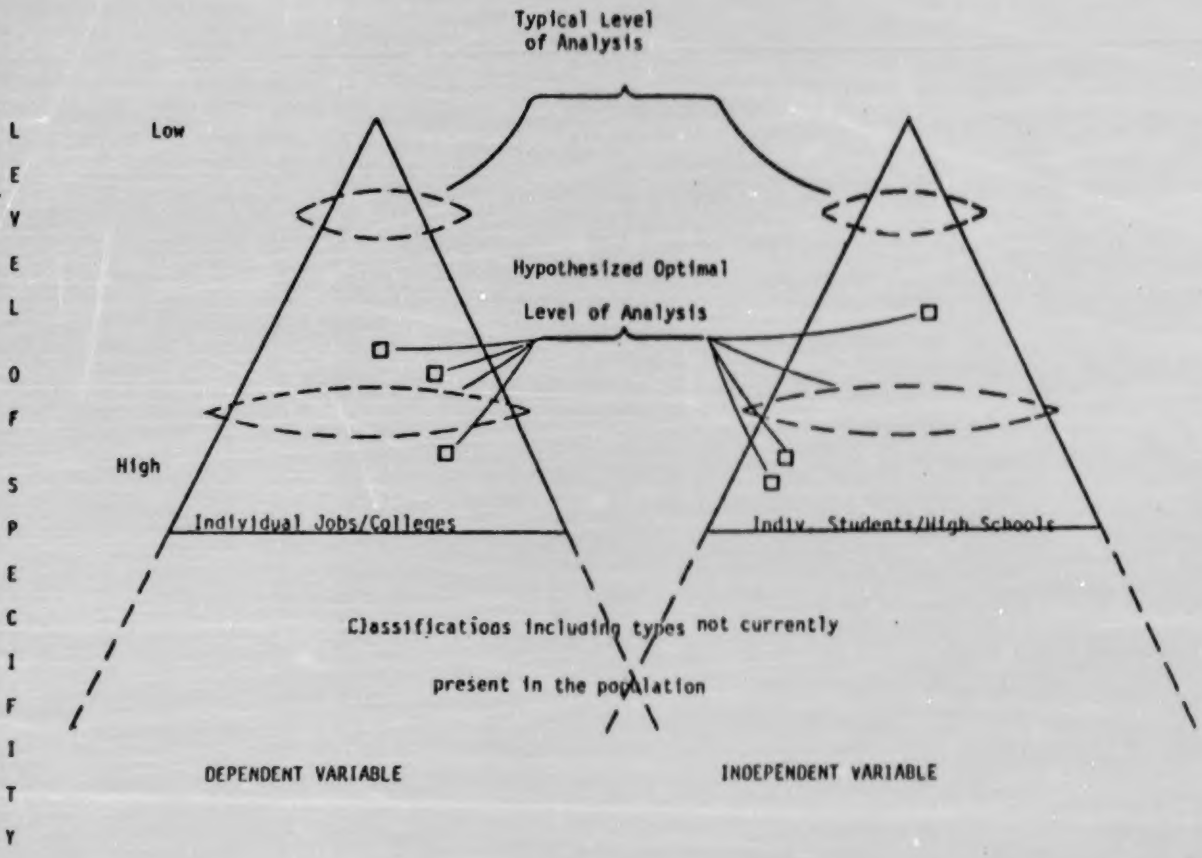
1979 Type of Institution	RGN 1	RGN 2	RGN 3	RGN 4	RGN 5	RGN 6	RGN 7	RGN 8	UNK NYS	O-O-S	FORGN	TOTAL
SUNY												
Unclassified	.54%	1.03%	1.32%	1.04%	.86%	.69%	.27%	.69%	--%	1.64%	.67%	.70%
Multiversity	10.24	2.33	1.78	.47	1.03	1.85	1.96	5.82	3.70	.44	3.72	3.21
University	9.64	7.29	8.79	3.17	6.40	6.80	2.54	7.67	7.98	.65	3.01	5.39
College Complex	5.40	9.00	8.72	13.53	9.17	7.89	1.52	6.63	8.04	1.36	2.61	5.12
College	.04	.04	.10	--	.17	.99	.78	1.22	--	.51	1.24	.64
Specialized School	.11	.21	.12	.05	.23	.43	.63	.89	--	1.63	.23	.59
Health Sciences Center	.03	.02	.17	--	.07	.02	--	.01	--	.01	--	.02
2-Year School	43.04	51.60	50.79	58.61	52.40	38.97	2.63	48.18	10.63	3.46	15.61	28.74
Subtotal	69.04	71.52	71.79	76.87	70.33	57.64	10.33	71.11	30.35	9.70	27.09	44.41
CUNY												
University	--	--	--	--	--	.18	18.63	.82	5.84	.76	6.10	6.05
College Complex	--	--	--	--	--	.22	6.30	.08	.71	.49	.67	2.01
College	--	--	--	--	--	--	1.91	.01	.32	.18	.47	.61
2-Year School	--	--	--	--	--	.37	28.61	.49	6.49	.51	12.02	9.14
Subtotal	--	--	--	--	--	.77	55.45	1.40	13.36	1.94	19.26	17.81
Independent												
Multiversity	1.49	3.66	4.44	1.42	3.18	3.57	4.19	2.47	8.69	27.90	16.65	5.85
University	1.76	3.81	2.19	1.42	2.16	6.18	12.83	10.66	23.67	14.35	9.01	8.73
College Complex	8.57	7.43	6.01	8.23	10.61	12.61	6.04	7.49	7.65	22.91	15.17	9.37
College	5.16	6.65	5.43	4.07	7.08	12.44	5.62	3.14	3.57	13.33	6.70	6.71
Specialized School	.01	.02	.03	.19	.05	.14	.36	.33	.65	1.63	2.41	.39
Seminary	.03	.01	.01	--	.03	.02	.03	.09	--	.16	.07	.05
Health Sciences Center	.03	.10	.17	.42	.43	.10	--	--	--	.01	.03	.07
Nursing School	--	.01	--	--	.08	.09	.16	.08	.06	.05	--	.08
2-Year School	3.52	1.11	1.78	5.16	2.62	1.66	.32	.29	3.05	4.31	.50	1.52
Subtotal	20.57	22.80	20.06	20.91	26.24	36.81	29.55	24.55	47.34	84.65	50.54	32.77
Proprietary												
College	.01	.01	.01	--	.05	.16	.29	.26	.39	.92	.13	.24
2-Year School	10.38	5.67	8.14	2.22	3.38	4.62	4.38	2.68	8.56	2.79	2.98	4.77
Subtotal	10.39	5.68	8.15	2.22	3.43	4.78	4.67	2.94	8.95	3.71	3.11	5.01
Total	100. %	100. %	100. %	100. %	100. %	100. %	100. %	100. %	100. %	100. %	100. %	100. %

SOURCE: NYSED: Postsecondary Information Systems/HEDS (GLR/SEP 81).

The manner in which researchers approach a student preference study greatly influences the breadth and utility of the results. While this paper does not draw firm conclusions about appropriate methods, it does discuss work in progress that may soon yield conclusions. The typical approach has been to examine a relatively small set of continuous variables for students with respect to one institution or a very small set of institutional variables. This top down approach is encouraged by both limited data sets and limited analytical techniques. As a result, for example, researchers seldom examine more than three general ability levels or two-way interaction variables (e.g., income-ability). It is not known whether complex interaction effects do in fact exist, but general institutional descriptions may well preclude finding any that do exist. Computing capabilities are now sufficiently great that a bottom up rather than a top down approach can be pursued. Institutional researchers have much to gain by collaborating and promoting the development of the large databases needed to pursue such a strategy.

In many ways the problem is one of classification for both students and institutions. Figure 2 illustrates the classification options. The broad base of each triangle represents very detailed student and institutional types. In the extreme, each type along the base would be an individual student or institution. Classification may occur at any lesser level of detail up to the peak of the triangle. At the peak, all students or institutions are grouped together in a single undifferentiated group. Research and theory suggest that explanation and prediction are most successful at interim levels of grouping for both the dependent and independent variables. Group means tend to be statistically more predictable until further grouping results in the groups becoming internally diverse on

FIGURE 2 CLASSIFICATION OPTIONS


Typical Level of Analysis
L E V E L O F S P E C I F I C I T Y
Low
High
Hypothesized Optimal Level of Analysis
Individual Jobs/Colleges
Indiv. Students/High Schools
Classifications including types not currently present in the population
DEPENDENT VARIABLE
INDEPENDENT VARIABLE

important variables.

An analogy may be drawn from the physical sciences where one must adapt to the uncertainty principle for subatomic particles, laws of atomic motion, and probabilities of machine life. A different level of student classification will probably be best for each level of or even each specific institutional classification. Most studies to date have relied on fairly undifferentiated classification levels. These generally have produced reasonable results although they usually cannot be applied easily in specific situations as on a particular campus. In enrollment studies I expect that the most enduring level of explanation will occur for somewhat more detailed classification of both institutions and students than is typically used today. Finding the optimal explanatory framework would be very useful in both improving enrollment projections and planning for specific types of institutions. Working from the bottom up rather than the top down should also make it possible to find unique interaction conditions which are not at the generally optimal level of grouping and which should be specifically monitored.

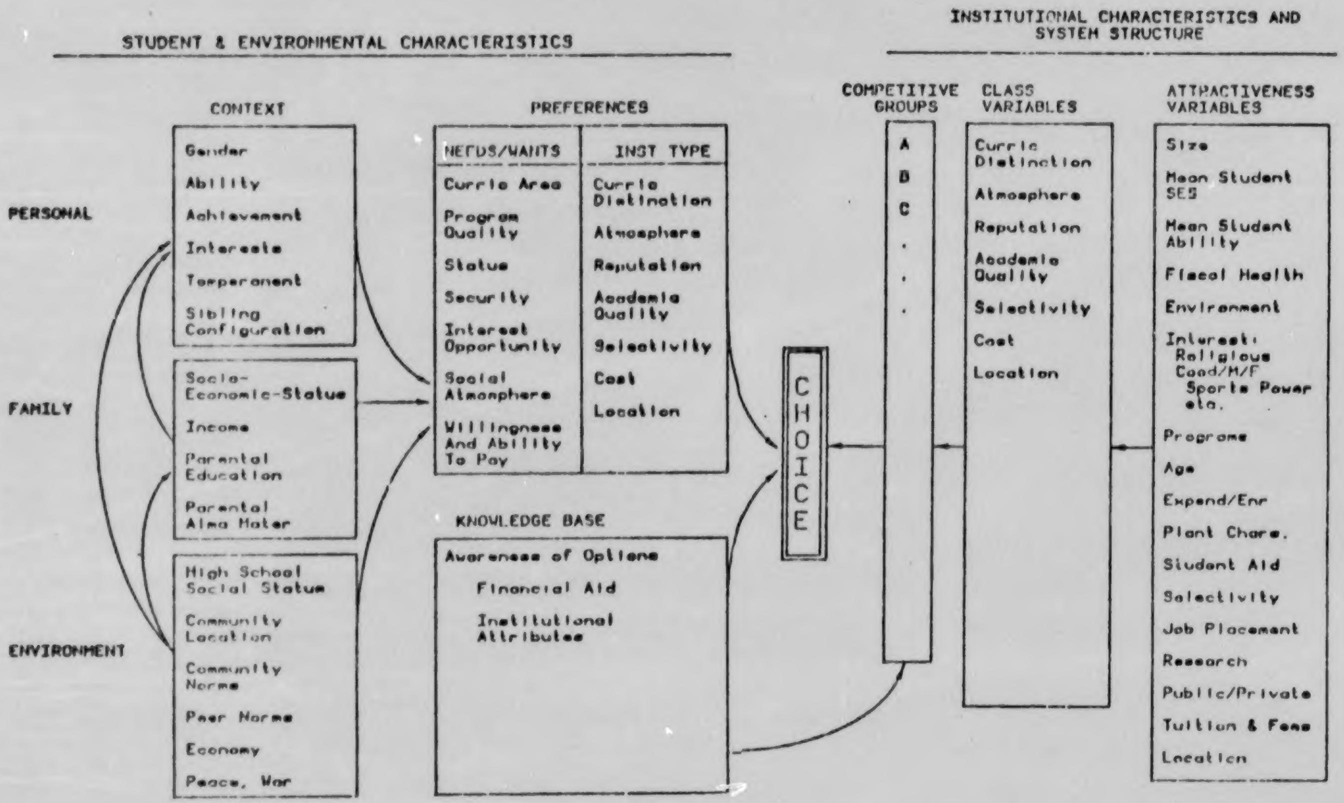
College participation or preference rates are direct measures analogous to the squared multiple correlation coefficient and level of explanation achieved in regression studies. Looking at preference rates for specific types of students easily permits examination of the specific influence for each of a large number of specific variable sets. Regression approaches help to describe the degree to which each variable contributes to a specific outcome. Similar conclusions seem to be possible from an analysis of preference rates by examining the pattern of rates among student types and across grouping levels. Good methods for conducting such an analysis need to be developed as do approaches to assessing statistical significance when the number of observations for a specific student type becomes small .

It might seem desirable to cluster or factor the student and institutional classification variables to produce independent variables for inclusion in the analysis. This has the great advantage of reducing the number of variables involved, but may also result in certain very specific interaction effects being masked. It is not known whether this is really a problem. It also seems likely that specific levels of specific types of ability would be more explanatory than a few general levels of general ability especially in association with certain other student characteristics. Thus, I am drawn toward beginning with very specific classification schemes.

Figure 3 summarizes student and institutional variables frequently considered in student choice studies. It is very easy to generate at least twenty variables averaging four categories each. Calculating all possible combinations produces almost 70 billion possible classifications. If we are to consider geographical locations or specific interests such as the 30 two-digit HEGIS program areas then the number of possible combinations is much larger yet. It is immediately desirable to limit where possible the number of variables and levels included for analysis, recognizing, of course, that the number of combinations cannot be larger than the number of respondents. Collapsing of classifications might be keyed to obtaining a sufficient number of respondents of each type to provide reliable results. Naturally, the larger sample sizes will permit more specific classifications to be analyzed than will smaller samples. A relatively large number of dependent variable types (in our case institutional types) also brings pressure for enlarging the sample size. Research needs to be undertaken to establish lower limits on sample size, but there is no reason that government agencies or consortia of colleges could not reasonably obtain data for 5,000-30,000

FIGURE 3

A DESCRIPTIVE MODEL OF VARIABLES OF STUDENT CHOICE


STUDENT & ENVIRONMENTAL CHARACTERISTICS
INSTITUTIONAL CHARACTERISTICS AND SYSTEM STRUCTURE
CONTEXT
PERSONAL
Gender
Ability
Achievement
Interests
Temperament
Sibling Configuration
FAMILY
Socio-Economic-Status
Income
Parental Education
Parental Alma Mater
ENVIRONMENT
High School Social Status
Community Location
Community Norms
Peer Norms
Economy
Peace, War
PREFERENCES
NEEDS/WANTS
Curric Area
Program Quality
Status
Security
Interest Opportunity
Social Atmosphere
Willingness And Ability To Pay
INST TYPE
Curric Distinction
Atmosphere
Reputation
Academic Quality
Selectivity
Cost
Location
KNOWLEDGE BASE
Awareness of Options
Financial Aid
Institutional Attributes
CHOICE
COMPETITIVE GROUPS
A
B
C
.
.
.
CLASS VARIABLES
Curric Distinction
Atmosphere
Reputation
Academic Quality
Selectivity
Cost
Location
ATTRACTIVENESS VARIABLES
Size
Mean Student SES
Mean Student Ability
Fiscal Health
Environment
Interest:
Religious
Coed/M/F
Sports Power
etc.
Programs
Age
Expend/Enr
Plant Chars.
Student Aid
Selectivity
Job Placement
Research
Public/Private
Tuition & Fees
Location

prospective students to support these analyses.

There are several options to analyzing the kind of data which has been described. If one is willing to focus on only one dependent variable (institutional) type and one decision level (express interest, apply, attend) then the Automatic Interaction Detector (AID) approach is an option (Lay, Maguire & Litten, 1981). AID examines the most "profitable" splits when a variable has more than two levels and works through a step-wise procedure to find the set of descriptors that provide the greatest association with the outcome (institutional type) of interest. It provides the proportion of students associated with the outcome at each level of classification. While the approach is helpful in identifying important interactions, it provides only a partial portrait and may miss important interactions. Its results are very straightforward and easy to understand by nonstatisticians.

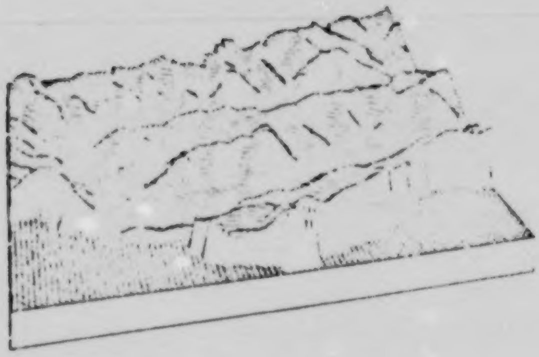
A second option is the use of a structural analysis approach employing qualitative factor analysis (Pruzek & Lehrer, 1980, Rowse & Wing, forthcoming). Student characteristics, institutions, and institutional characteristics are defined in qualitative terms and entered together into the factor analysis using whatever similarity or correlation measure is appropriate at the time. The patterns evident from loadings in the factor matrix suggest student and institutional classifications, indicate linkages between them and identify both linear and nonlinear interaction effects. The capability of performing essentially multiple tasks in one pass and of including multiple dependent variables in a single analysis are very attractive. However, the approach does have limitations associated with cumbersome computation for very large data sets and with interpretation concerns common to factor analysis. It is not quite as easily understood for the nontechnical person as are other techniques.

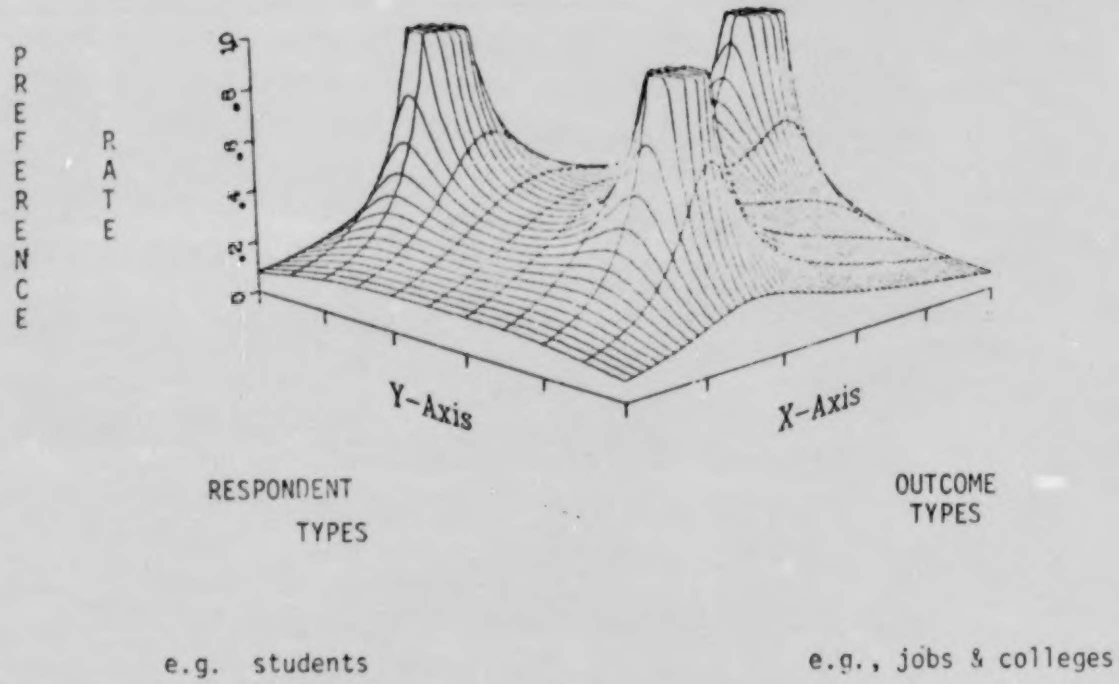
A third option involves a fairly straightforward computation of preferences rates for prespecified categories of students, high schools, institutions and academic programs. By initially preparing a matrix of preference rates for highly specific classification criteria, it is feasible to later collapse this baseline matrix in a variety of ways to search for an optimal classification level. Regardless of the classification scheme used, the baseline matrix will be no larger in length than the number of respondents or data points available. Collapsing of the matrix can be based in part on obtaining a reasonable sample size for the student types of interest. The width of the matrix is determined by the dependent variable classification selected. It will likely be necessary to limit these categories before starting to obtain a feasible task. The selection of initial classification schemes is critical as they define limits on the interactions that can possibly be identified.

This third approach is just beginning to be developed. While it is appealing in its simplicity,comprehensiveness and directness, it is not clear whether or not collapsing of the baseline matrix will be a straightforward task. One basis for collapsing and perhaps a routine first step would involve insuring that reasonable sample sizes exist for all types of students submitted to analysis. Further collapsing should continue until the preference rates no longer get larger and even begin to diminish in size. Distribution of the size of preference rates might be calculated for each combination of levels of student and institutional classification. Distributionsskewed toward large rates would be preferred and very large rates representing influential interactions should be sought and saved from each stage of the analysis. However, to select the course of data reduction,

FIGURE 4

3-Dimensional Mapping of Preference Information





more information is needed. The matrix might be visually scanned or three dimensional maps generated (see Figure 4). The axes of the map would be institutional types, student types and outcome (e.g., preference rates). Somewhat similar classifications having similar rates would be targets for collapse. Plateaus on the three dimensional map would be easily visible and would suggest a route to reducing the classifications. It is not clear whether the ordering of types in the matrix would be crucial or not. If so multiple sorting and review of the results might be necessary. These concepts need to be tried, developed and tested to see whether the general approach is worthy of continued attention.

A Study of Preference

The latter two analytical approaches will be applied to a survey of 18,000 high school seniors collected in the spring of 1981. Ninety-three high schools representative of New York State on variables of size, wealth, race, urbaness, and region were included in the survey. An effort was made to survey all seniors in each sampled school. School and college characteristic files will be merged with the many student descriptors collected in the survey to allow some very detailed analyses appropriate to specific institutions located both in and out of the State. It is expected that a report describing student preference information will be prepared in 1982. Comparison of the results with demographic forecasts of population characteristics should be helpful to planners in specific types of institutions.

REFERENCES

Lay, R. Maguire J. & Litten L. Identifying Distinctive Groups in a College Applicant Pool. Revision of a paper prepared for presentation at the Twenty-First Annual Forum of the Association for Institutional Research in Minneapolis. June 30, 1981.

Pruzek, R. & Lehrer, R. A General Method for Structural Analysis of Relationships Among Qualitative Variables. An unpublished manuscript, State University of New York at Albany, 1980.

Rowse, G. & Wing P. Assessing Competitive Structures in Higher Education. Journal of Higher Education, Forthcoming, accepted August 1981.

COMP AS A MEASURE OF EDUCATIONAL IMPACT

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This paper is a preliminary report of an on-going research project using two forms of the College Outcomes Measurement Project (COMP), to determine the impact of general education and college program on students at Upsala College, a small, liberal-arts college in New Jersey.

In recent years, colleges have become more interested in evaluating programs and outcomes associated with general education. Measurements of abilities of majors in specific fields have existed for a long time, for example the various Graduate Record examinations, the LSAT, and MCAT. Instruments for measuring general education are more recent.

Upsala College began planning a study of the impact of its programs in 1978, as part of a Title III project. A committee of faculty and administration reviewed the instruments available and chose the COMP test, developed by the American College Testing Service[1], as appropriate for the research. The COMP test measures six outcomes areas: Functioning in Social Institutions (FSI); Using Science and Technology (US); Using the Arts (UA); Communicating (C); Solving Problems (SP); and Clarifying Values (CV). Two of these areas, Communicating and Solving Problems, are ability measures. The other four areas each involve identifying activities, understanding the impact of the area on individuals and groups, and analyzing data within the area. The skills involved and the categories of areas reflect the aims of a liberal-arts education.

Research Design

The first objective of the research was to use the COMP instrument to measure the impact of an Upsala education on the students. However, the COMP instrument is available in two parallel forms; the Composite Examination and the Objective Test. A second objective of the research was to decide which form of COMP was most useful in this kind of evaluation.

The Composite Examination is a series of fifteen stimulation activities based on materials available to adults through various media. The activities require application of general knowledge and skills; students respond with a variety of writing styles and an oral sample. The Composite examination yields specific information on writing competency, oral skills, and detailed analysis of responses, but requires four hours to administer and time-consuming local scoring. The committee designing the research at Upsala was interested in balancing the depth of information from the Composite Examination, the additional time required to score it, and the needs of the research.

The second form of COMP, the Objective Test, is a proxy measure for the Composite Examination. Again, fifteen stimulation activities based on realistic materials requires response from the students, but the responses are in a multiple-choice format. The test takes two hours to administer and is machine scored.

The Upsala research project was designed to take place over two years. The major reason for testing and re-testing was to gain a profile of entering freshmen and exiting seniors over time; a second reason was to determine the appropriate form of COMP for future research. The research design is shown in Table I.

The first set of paired tests is completed and the data under analysis.

The second set of paired tests was completed in October 1981 and the data are not yet available.

Table 1

Research Design

Date	COMP form	Student sample	No.
Spring 1980	Objective	Seniors who had entered as freshmen	36
Fall 1980	Objective	Freshmen matched to seniors	36
Spring 1981	Composite	Seniors who had entered as freshmen	36
Fall 1981	Composite	Freshmen matched to seniors	36

The 1980 Sample

Ideally, a study of general education should test first-time, full-time freshmen during their first semester and re-test these same students in four years. This design is impractical when results are wanted quickly. A design using matched samples of entering freshmen and exiting seniors yields useful information more quickly.

Since the research is concerned with measurements of effects of Upsala education, the focus of the research was on those students who had spent most of their academic career at one campus. For the seniors, the pool from which the COMP sample was drawn was made up of those students who had spent four years at Upsala, with no more than two courses at another institution, and who were expected to graduate. The graduating class in 1980 had 255 seniors, 143 of whom had started as freshmen four years previously. Half of the eligible seniors were asked to take part in the research; thirty-six actually did so. The general descriptive statistics of these thirty-six students were checked against the general description of the senior pool and the senior class; the sample was judged representative in terms of SAT backgrounds, interest areas, sex, and program of entry into the college (Equal Opportunity Fund entry or regular admittance).

In the Fall of 1980 a sample of incoming full-time, first-time students was drawn from the 300 member freshman class, matched by SATs to the senior sample. Fifty students were chosen; thirty-seven took part. The two samples are somewhat different, the freshman sample being somewhat lower in entering achievement than the senior sample. However, the difference is small and not unexpected. Research has shown that between 40 and 45% of an entering Upsala freshman class will graduate from the school in four years; it is the students with the better backgrounds that graduate. A sample of graduating seniors will represent only students who were retained. A sample of freshmen will include both those who will graduate and those who will drop out. The two samples were examined and judged sufficiently similar so that comparisons drawn between the two groups would be valid.

Results

1. Comparisons of the Scores of Freshmen and Seniors

Tables 2 and 3 show the pattern of results on the COMP variables for the freshman and senior samples of 1980. Significant gains were recorded both in the Total COMP scores and the subscores. The range of the scores contains a degree of overlap, associated with the widely differing backgrounds and abilities of the students.

The range of raw scores in both the freshman and senior samples is almost as great as the test permits. Comparison of the mean scores for the two groups yields more information. Since the base number for comparison shifts with each subscore, the mean scores for each group are most usefully discussed in proportional terms.

Table 2

COMP Results, Freshmen

COMP	Total Possible	Maximum Scored	Minimum Scored	Mean	Standard Deviation	Standard Error
Total	340	208	142	170	16.9	2.7
FSI	80	69	42	57	6.9	1.1
US	80	75	44	59	7.1	1.1
UA	80	67	44	54	5.8	0.9
C	72	60	34	47	6.4	1.0
SP	96	88	52	70	7.8	1.2
CV	72	64	40	53	6.3	1.0

Table 3

COMP Results, Seniors

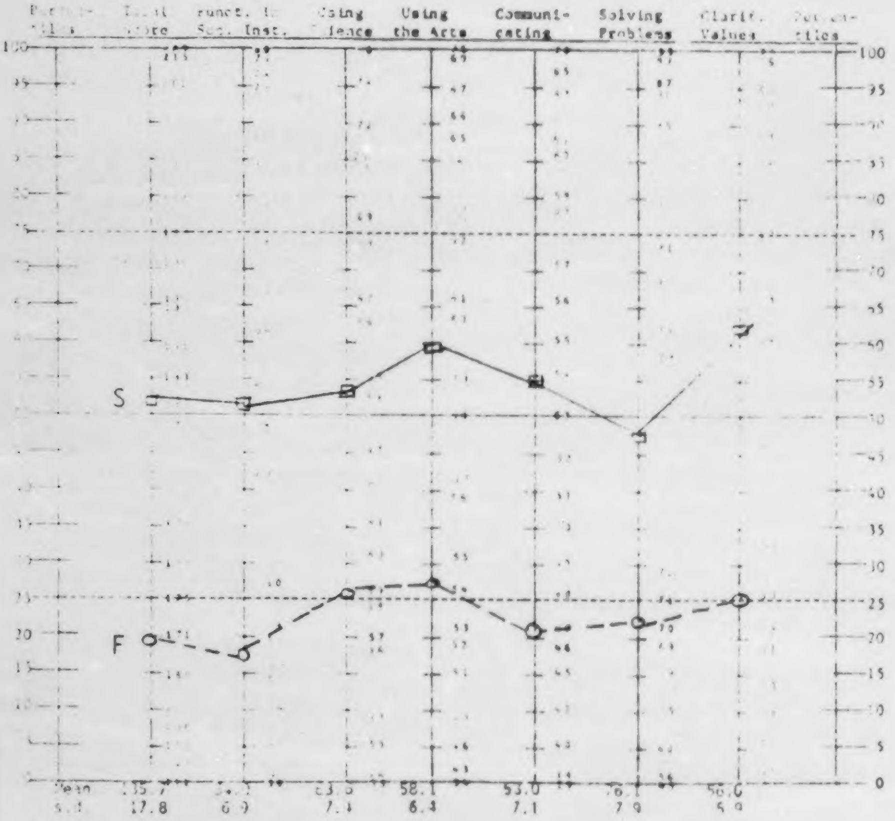
COMP	Total Possible	Maximum Scored	Minimum Scored	Mean	Standard Deviation	Standard Error
Total	340	217	148	188	16.6	2.7
FSI	80	75	48	64	6.3	1.0
US	80	77	48	64	7.5	1.3
UA	80	73	46	59	5.8	0.9
C	72	70	39	53	7.0	1.2
SP	96	88	52	76	7.6	1.2
CV	72	89	46	58	5.0	0.8

Chart I shows the scores of the freshman sample (dotted line) and the senior sample (solid line) for 1980. The chart, developed by ACT, shows the array of senior norms for the 1,886 seniors at 30 institutions who took part in the research. The Upsala entering freshmen scored around the

25th percentile of the senior national sample. The percentile ranks are of course different from the percentile ranks the same scores would have achieved against a national freshman norm. For comparative purposes, however, it is useful to plot the two sets of scores against the same percentile distribution.

Chart 1

Mean COMP Scores of the Freshman and Senior Samples



Compared against the national sample, the areas of greatest strength in the entering freshmen were in Using Science and Using the Arts, although the differences between these two areas and the other areas is only marginally significant. For the seniors, the greatest strength identified was in

Clarifying Values; the smallest amount of skill was shown in Solving Problems. Again, the differences between the areas is only marginally significant.

Assuming that the freshman sample is matched to the senior sample, the chart shows significant increases in COMP scores for all variables. The Total COMP figure shows a rise of 31 percentile points. All six subscores show significant increases, but two areas, Solving Problems and Using Science, were identified as areas of the least growth. Table 4 shows the percentile changes for the COMP subscores:

Table 4

Changes in Mean COMP Scores

COMP Subscore	Percentile Change
COMP Total	31
Clarifying Values	36
Using the Arts	35
Communicating	32
Funct. in Soc. Inst.	27
Solving Problems	19
Using Science	18

2. Using the COMP Scores to study Educational Requirements

A general method for relating COMP results to educational programs was developed. The College requirements were compared with the COMP categories and decisions were made about which requirement was reflected in one or more COMP categories. The difference in scores for entering freshmen and exiting seniors were correlated with the college requirements. The effectiveness of the array of requirements could then be determined.

As part of the preparation for the research a group of faculty members reviewed the distribution requirements of Upsala College and determined how they related to the six areas measured by COMP. Upsala requires 32 four-credit courses for graduation; the general requirements cover 13 of these courses. These requirements are distributed through "Area requirements" on the chinese menu principle; the area must be filled, but the choice of courses among these listed is up to the student and the advisor. Upsala's requirements under which the 1980 seniors graduated were:

a. Quantitative	1 course
b. the Arts	1 course
c. Natural Science	3 courses
d. Western Civilization	3 courses
e. Language/Cultural Studies	3 courses
f. Values in Contemporary Society	1 course
g. Freshman Seminar (a writing course)	1 course

These requirements fit into the six COMP categories as follows:

General Requirements

	A	B	C	D	E	F	G
FSI				X	X		
US	X		X				
UA		X		X			
C					X		X
SP	X		X				
CV			X			X	

It is clear from the previous section that the lowest growth on COMP takes place in the Solving Problems and Using Science categories; these categories reflect two of the Distribution requirements areas. These two required areas were targeted for attention in the next round of COMP testing, which was scheduled to use the Composite Examination form; this form yields information in greater detail and will allow the apparent weakness to be examined over time.

3. Additional Use of the COMP Results

At the end of the second semester, grade point averages were collected for 36 of the 37 freshmen in the sample. The association between GPA and the COMP Total Score was .50 ($p = 0.001$); of the subcategories, the greatest correlation was with the Functioning in Social Institutions subset (.55). This information is being used in a parallel study of retention and the aspects of student profiles that can be used to predict success in college.

Conclusions

The research is two/thirds of the way through the design, and tentative conclusions may be drawn. 1) The COMP test yields valid and useful information for the analysis of general education; 2) the instrument of choice within COMP will depend on the depth of information needed to answer the objective of the research; 3) data from the COMP profiles can be used in studies of student characteristics unrelated to studies of general education. The project will continue through 1982, and further analyses are planned.

Footnotes

[1] Information on the make-up and validity of the COMP tests is drawn from the Annual Report, 1977, of the College Outcomes Measurement Project. The American College Testing Program, Iowa City.

THE EFFECTS OF SKILLS MEASURES ON STUDENT RETENTION: A LONGITUDINAL ANALYSIS

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During the past decade, circumstances have made student retention a critical topic for analysis amongst colleges and universities. Financial considerations have forced institutions to be concerned with predicting-- and, if possible, increasing-- the proportion of students who successfully complete their degree programs. Several empirical studies have resulted from this concern; such analysts as Bean (1980), Terenzini and Pascarella (1980), Newlon and Gaither (1980), and Churchill and Iwai (1981) have built predictive models out of the social, psychological, and structural factors which affect retention. But these models do not emphasize a specific cluster of factors, involving the students' abilities, as measured by standardized test scores and high school class ranks. The following study will investigate two aspects of the relation between skills measures and retention: 1) how strongly the measures affect retention, and 2) the means by which the measures affect retention.

Methodology and Study Design

This analysis uses a complete sample of all full-time students who entered a bachelor's degree program in the Fall semesters of 1977 through 1980, at Upsala College, in East Orange, New Jersey. Data was collected on these students through the Spring semester of 1981. As a result, these students will have completed 2, 4, 6, or 8 semesters (depending on the year they started) if the college retained them in the program; the sample

45

thereby includes students who should have finished their freshman, sophomore, junior, or senior years. 1493 students fit these requirements, and were included in the study.

This project split the sample into four parts, according to the years in which the students first registered; thus, retention will be studied separately for freshmen, sophomores, juniors, and seniors in the sample. It is useful to consider retention rates as a percentage of a fully-retained student's career, though; this dependent variable measures the percentage of semesters a student was retained, out of the total semesters he could have been retained, by Spring 1981.

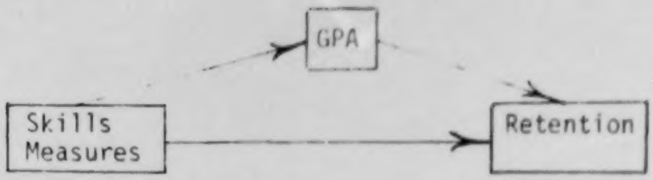
To begin this analysis, the dependent variable was correlated with the basic skills scores, SAT scores, and high school class ranks of the four classes of students in the sample. The results had several striking features. First, none of the measures predicted attrition amongst freshmen; with the exception of the Total English raw score, all of the factors had insignificant correlations with the retention measure. The factors' usefulness for predicting retention increased for sophomores, juniors, and seniors; with the exception of SAT scores for juniors, all of the abilities measures had significant correlations with retention. These correlations were highest for sophomores, next highest for juniors and seniors, and lowest for freshmen.

Why should this pattern of predictability exist? A possible answer lies in the students' grade point averages. One would expect that skills affect retention by affecting the student's academic success in college--i.e. by affecting their GPA's; if this expectation were correct, though, then GPA should have the strongest relationship with retention during the sophomore and junior years, a weaker relationship during the senior year, and the weakest relationship during the freshman year. When the correlations between GPA and retention were computed, these expectations were confirmed.

The pattern of relationships between GPA and retention thus appears to follow the pattern of relationships between the abilities measures and retention. Two questions arise from these results: 1) do the skills measures affect retention by affecting GPA's? and 2) what are the means by which these effects occur?

GPA as an Intervening Variable

In order to discover whether GPA intervenes between skills scores and retention, these scores were first correlated with GPA, to check for the presence of relationships. All of the abilities measures-- i.e. class rank, SAT scores, and basic skills scores-- correlated with the students' grade point averages; moreover, these relationships tended to be strong (around .3), with good significance levels (less than .000). This data leads one to suspect that GPA is indeed the intervening variable between the skills scores and student retention; to confirm this suspicion, the correlations between the skills scores and retention were run, with partials controlling for the students' GPA's. If GPA does intervene between the abilities measures and retention, then the relation between these latter two factors should be reduced when grades are partialled out. These relations were reduced; in fact, any relationships which existed disappeared, and relationships which did not exist before appeared as negative. These results proved that the skills measures affect retention through their effect on students' grades; this relationship is presented graphically below.



Having stated a relation between skills, GPA, and retention, one must return to the question which began this investigation-- i.e. how will changes in the students' skills measures affect the student body's retention rates. Obviously, if those changes necessarily lower the students' GPA's, one can expect the retention rate to go down; but how much of the effect which GPA has on retention can be explained by these skills scores? To state that all of the abilities' measures effects on retention occur due to GPA is not to state that this relation explains why GPA affects retention-- for the latter statement to be true, GPA and the skills scores would have to be equivalent measures. To judge the degree to which the skills scores affected the relation between GPA and retention, correlations between the latter two factors were run, with controls for the skills measures. The results proved that the skills measures do not adequately describe the relations between GPA and retention; these relations are hardly reduced when one controls for the abilities measures. The evidence suggests, then, that the skills scores and GPA are not equivalent measures; although the scores expended all of their effects through GPA, there are other aspects of GPA that relate to retention-- i.e. perhaps interest, motivation, etc.-- which are not described by the skills measures.

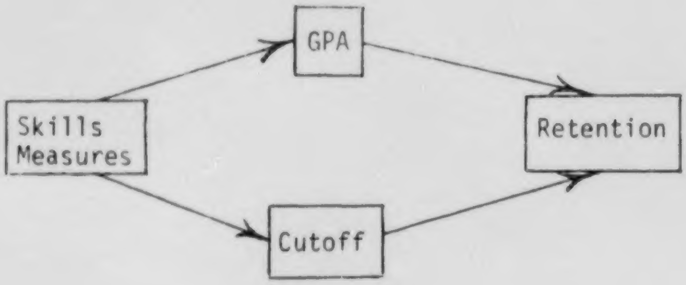
Because GPA and skills measures are not equivalent, the question of how skills affect retention arises once again. Perhaps the skills scores do not describe the relation between GPA and retention adequately because the skills measures are only effective as a means for separating students who will be dismissed for academic difficulties from students who will not. All the other variance in the relation between GPA and retention would thereby not be explained by the skills measures. To explore this possibility, students were coded into groups according to whether they were above or below the dismissal GPA for their class; controlling for this cutoff variable is thus equivalent to removing the effects of students in academic trouble from the sample.

Correlations were run next between this new variable and the students' retention rates; the results indicated that there is indeed a correlation between this cutoff variable and retention for freshmen, sophomores, and juniors. If the cutoff variable is an important intervening factor between skills and retention, though, two relationships must exist: first, this variable must correlate with the abilities measures, and second, this variable must reduce the relation between the abilities measures and retention, when one uses it as a control factor for that relation. When the first relationship was investigated, the correlation did exist; the skills measures correlated with whether or not a student was in danger of dismissal, for all measures and for all classes of students.

In order to investigate the second relationship, the skills scores were correlated with retention, with a control for whether or not the student was in academic difficulty. The results indicated that controlling for the cutoff variable did reduce the relations between skills and retention, in all cases where the cutoff variable correlated with retention--i.e. for freshmen, sophomores, and juniors. One must note, though, that this control did not have as strong an effect as the control for GPA; in fact, some relationships did remain after the effects of having the flunking students in the sample were removed. In all cases, however, this cutoff variable explained at least half, and often more, of the effects which skills have on retention.

These results still leave many of the same questions which were raised when the relationship between GPA, skills, and retention was investigated. First, one must discover whether the cutoff variable and the skills measures are equivalent measures; the method of making this determination is the same as the method used above with GPA-- that is, the cutoff variable and retention were correlated, with a control for the basic skills scores. The results indicated that the relationship is not substantially reduced when the effects of the skills scores were removed. Thus, even though the scores expended much of their explanatory power by determining who is in danger of being dismissed, these scores explained very little of the relation between the cutoff variable and retention.

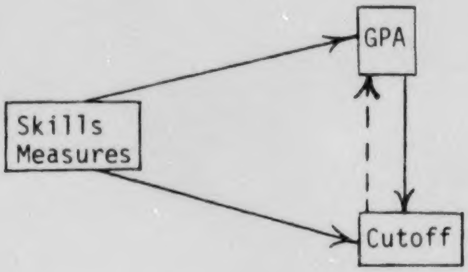
The relationships which have been discussed so far are described diagramatically below; as the illustration indicates, GPA and the cutoff variable are both intervening factors between skills scores and retention.



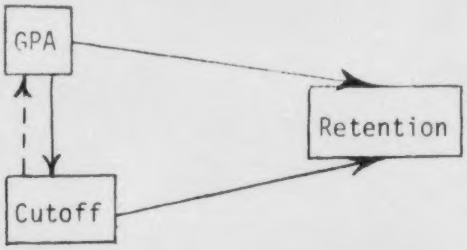
This investigation using the cutoff variable was begun in order to describe the exact relationship between GPA, retention, and the skills measures. This investigation is not complete, then, without some description of the relationships between the cutoff variable and GPA, particularly with reference to GPA's relations with other factors in the model. Three questions arise concerning these relationships: 1) how the cutoff variable affects the relations between basic skills and GPA, 2) how the cutoff variable affects the relations between GPA and retention, and 3) how the cutoff variable fits into the overall model of skills scores, GPA, and retention.

Interrelationships Amongst Discriminating Factors

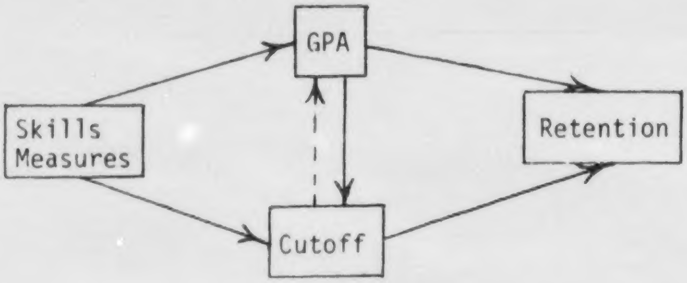
In order to study the first question, correlations between skills scores and GPA were computed, with partials controlling for the cutoff variable; also, correlations between the skills scores and the cutoff variable were computed, with partials controlling for GPA. The results indicated that the relations between the cutoff variable and skills measures disappeared when one controlled for GPA. Conversely, the relations between skills measures and GPA did not disappear when one controlled for the cutoff variable, but these relations were, for the most part, substantially reduced. There thus appears to be a weak equivalency between these two factors, with regard to basic skills scores; that is, GPA explains all of the relationship between the cutoff variable and skills, while the cutoff variable explains part of the relationship between GPA and skills. Such a result is no surprise, since one would not expect that all of the relations between skills and grades could be summarized by describing which students are likely to flunk out. The resulting relations are diagrammed below.



The second question, concerning the relations between GPA, retention, and the cutoff variable, was handled in a manner similar to the first; that is, the correlations between GPA and retention were computed, with partials controlling for the cutoff variable, and correlations between the cutoff variable and retention were computed, with partials controlling for GPA. There appeared to be a strong equivalency between GPA and the cutoff variable with respect to their effects on retention (with the exception of seniors in the sample, for whom the cutoff variable has no effect on retention). The control for GPA removed all relationships between the cutoff variable and retention, while the control for the cutoff variable significantly reduced the relationships between GPA and retention. In fact, one should note that for freshmen, the two measures appeared completely equivalent, as both controls eliminated all effects which the other factor had on retention. This result for the freshman class indicates that the fear of flunking out might explain all of the relation between freshman grades and retention. These relationships are summarized diagramatically below.



The final question concerns the way in which all the factors and relationships studied thus far fit together in a model which affects retention. To answer this question, the correlations between the skills factors and retention were computed, and first-order partials were run, controlling for GPA and the cutoff variable, separately; next, second-order partials were run, controlling for GPA and the cutoff variable at the same time. If the second-order partials do not reduce the skills/retention relationship more than both of the first-order partials, then one may conclude that the two controls define measures which are somewhat equivalent in the model, given the above relationships. Correlating skills and retention with a control for GPA and the cutoff variable did not generate coefficients which were significantly lower than the coefficients which resulted from the control for GPA alone. One may thus conclude that GPA and the cutoff variable are similar measures in the model, as summarized diagramatically below, with the reservation that GPA is the more powerful explanatory variable.



Conclusion

This essay began by posing questions about the strength and exact nature of the relationship between skills measures and retention. The analysis discovered that skills measures tended to explain between 3% and 5% of the variance in retention, with the variables' explanatory power being highest for sophomores and juniors, lower for seniors, and lowest for freshmen. These results suggest that the skills scores are not adequate measures for predicting student attrition, since these scores leave much of the variance in student retention unexplained. One should not assume from these results that changes in students' skills scores will not affect retention, though; a problem with correlating skills measures and attrition at any particular school is that the range and distribution of such scores tend to be limited within the institution. Thus, one is often faced with explaining a wide variance of retention rates, using a small variance of skills scores; if the distribution of scores changes, though, particularly with the addition of students at the lower end of the curve (due to falling scores amongst entering students), a stronger relationship between the scores and retention might emerge. These questions of change lead one to study the exact nature of the skills/retention relationship.

It was discovered that skills scores affect retention by affecting the students' GPA's. The analysis also discovered that part of this effect occurred because the skills measures affect whether or not students will be in danger of being dismissed; this cutoff factor does not explain all of the effect, though, for GPA had a relationship with retention even when one removed the effects of having students in academic trouble in the sample. Finally, the skills scores are not equivalent measures with either GPA or the cutoff variable; most of the effects which these latter two variables have on retention cannot be explained by the students' abilities measures.

Would a change in skills scores lead to a change in retention rates amongst students, then? If these skills changes affected the distribution of GPA's, then one should expect some corresponding effect on retention rates; if these changes affected neither the distribution of GPA's nor the proportion of students in danger of academic dismissal, though, one should not expect changes in the retention rate. These results emphasize the central role of GPA in predicting retention, but they also suggest why GPA has its explanatory power. GPA does not affect retention because it reflects students' abilities, at least as those abilities are measured by the skills scores; the fact that GPA and the cutoff variable both affect retention when one controls for skills proves this point. Perhaps, then, other factors which a higher GPA reflects-- factors such as motivation, interest, and student involvement in the institution-- might explain the relationship which GPA has with retention. This conclusion does not deny that skills affect retention. More importantly, though, this conclusion does not deny that skills scores affect GPA; indeed, these measures have profound effects on students' cumulative grades. Instead, these results indicate that skills measures do not affect that portion of GPA which impacts on retention; this fact should be considered in the design of intervention strategies for improving retention by raising students' grades.

More effective intervention strategies must therefore await a more complete analysis of the relations between GPA and retention. Such an analysis might include measures of motivation and interest, along with the abilities measures. For this study suggests that skills scores do not tell enough about students to describe their chances for completing a degree program-- thus, in academia, as in other fields of endeavor, ability is related to achievement of one's goal, but is seldom an adequate explanation for it.

REFERENCES

Bean, John P. Dropouts and Turnover: The Synthesis and Test of a Causal Model of Student Attrition, Research in Higher Education, 1980, 12 (2).

Terenzini, Patrick T. and Pascarella, Ernest T. Toward Validation of Tinto's Model of College Student Attrition: A Review of Past Studies, Research in Higher Education, 1980, 12 (2).

Newlon, Lorraine L. and Gaither, Gerald H. Factors Contributing to Attrition: An Analysis of Program Impact on Persistance Patterns, College and University, 1980, 55 (3).

Churchill, William D. and Iwai, Stanley I. College Attrition, Student Use of Campus Facilities, and a Consideration of Self-reported Personal Problems, Research in Higher Education, 1981, 14 (4).

AN EXPERIMENT IN USING ACT-COMP

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Early in 1979, the University of Connecticut accepted an invitation to participate in a field test of an experimental testing program designed and developed by American College Testing staff, under a grant from FIPSE. The College Outcomes Measures Project (COMP), begun by ACT in 1976 and not marketed until 1979-80, interested us because its objective was to find ways "to measure and evaluate certain kinds of knowledge and skills that undergraduates are expected to acquire as a result of general education -- the knowledge and skills that are believed necessary for successful functioning in adult society." (COMP Prospectus, 1979)

The 1978 COMP Prospectus stated that

a) student performance on the Measurement Battery "appears to be related to the educational programs of the ... institutions and unrelated to simple maturation";

b) that the Battery "appears to measure abilities not measured by college grades"; and

c) that the Battery "does seem to measure abilities relevant to functioning in adult roles."

The intriguing combination of a variety of stimulus materials and of various modes for student response appeared to offer a useful framework for looking at six outcomes areas (communicating, solving problems, clarifying values, functioning within social institutions, using science and technology, and using the arts) and two skills areas (speaking and writing). A subsequent version of one of the COMP instruments (the Composite) included assessment of computing and reading skills, but these have been dropped from the listing in the most recent (1981-82) prospectus I have seen.

The Measurement Battery outcome and skills areas are described in Attachment A. The scoring method required integration of the writing and speaking skills with the content of the student responses in the three areas of social institutions, science and technology, and the arts.

While all the ACT/COMP forms are stimulus materials, they differ in terms of student time required, in the mode of student response, and in the method of scoring. Briefly, the full Measurement Battery required six hours of each student's time and substantial faculty time to score each student's performance -- both for content and for the skills of writing and speaking. The Composite Form requires four hours to complete and just short of an hour of faculty time to score each test. The Objective Form, intended to be a proxy for the longer Composite Form, requires two hours of each student's time and can be machine scored.

The ACT staff have been developing norms for students at the senior and freshman levels and for various types of institutions. They have also been developing norms which equate the results of the Measurement Battery, the Composite Form, and the Objective Form of the COMP.

The University of Connecticut elected to use the full Measurement Battery Form of COMP. Apparently we were one of only a few institutions to do so. Indeed, ACT has discontinued use of the Measurement Battery and has concentrated its development and marketing efforts on the Composite Form and the Objective Form.

At a previous NEAIR meeting, Dr. Charles McLaughlin and I described the University's experience in the administration of the Measurement Battery. Dr. McLaughlin's group -- the Center for Educational Innovation -- handled the administration of the Battery to 69 seniors at the University of Connecticut in Spring 1979 and to 45 freshmen in Fall 1979. There were significant logistical problems in arranging for six hours of testing, including setting up a variety of audio-visual material required for the testing, and the taping of individual student responses to some questions and situations present in the Battery.

The University administration was very supportive in making faculty time available for the scoring of the responses. Four faculty members -- representing the areas of social science, the arts, the sciences, and writing and speaking -- were involved. Each faculty member received released time from one course in Spring 1979 to participate in the training for the scoring and for the actual scoring of the senior and freshman responses.

After the initial decision to limit the participants to students who had completed all of their work at the University, the senior participants were randomly selected from liberal arts and sciences majors in three broad areas: 1) social sciences; 2) natural sciences and biology; and 3) humanities. In addition, a sample from seniors (again excluding transfers) in the School of Engineering was selected. The freshman participants were volunteers from sections of English composition, without a planned distribution among schools or fields. The seniors were paid $30 for participating. The freshmen were not paid but some of the instructors in the English Composition sections from which the students were selected did permit students to substitute participation in the test for some minor part of the course requirements.

The University of Connecticut senior and freshman participants had the following profiles:

		Seniors		Freshmen	
		#	%	#	%
Field:	Social Sciences	21	30	11	26
	Humanities/Arts	22	19	4	9
	Physical & Biological Sciences	13	32	6	14
	Engineering	13	19	5	12
Other:	Business	--	--	11	26
	Pharmacy, Nursing, Education, Agriculture	--	--	4	9
	Undecided	--	--	2	4
SAT Scores:	Verbal & Quantitative Combined[1]	#	%	#	%
	Less than 800	1	1	--	--
	800 - 890	6	9	2	5
	900 - 1000	7	10	8	18
	1010 and above	55	80	33	77

Grade Point Average Seniors (4.0 = A)	#	%
1.50 - 1.99	1	1.4
2.00 - 2.49	19	27.5
2.50 - 2.99	22	31.9
3.00 - 3.49	20	29.0
3.50 and above	7	10.2

High School Rank Freshman (in %iles)	#	%
Not Available	1	2.3
Below 60th	2	4.6
60 - 69th	5	11.6
70 - 79th	7	16.3
80 - 89th	10	23.3
90 - 99th	18	41.9

[1] These SAT score groupings were employed in the ACT report of test results.

The University was interested both in the actual levels of performance of our students and in comparisons with the performance of students at similar institutions. Since there were only a few institutions in the Measurement Battery reference group for seniors and six institutions in the freshmen reference group, the University has not made any use of the norms developed by ACT. And while the equating of these norms with the norms from the other forms was undoubtedly carefully and correctly carried out, I have reservations about equating the performance on the Measurement Battery -- which required entirely student-generated responses, both written and oral -- with the forms which either substantially or completely presented multiple-choice options to the students.

The University's principal interest in the experimental test results, therefore, became the area of comparison of the performance of our own freshmen and seniors on the full Battery. We recognized that the method of selecting the two groups of participants did not provide the basis for a "controlled experiment" but we felt that the differences in performance between seniors and freshmen might provide some insight into the potential usefulness of the Measurement Battery for evaluating general education outcomes.

ACT provided the University with a Preliminary Report in July 1979 on the senior testing and a Final Report in April 1980 on both the senior and freshman testing. The Final Report consisted of a five-page summary of the project, tables indicating the correction factors applied to the total and eight area mean scores for UConn's freshmen and seniors, tables plotting mean performance of the two UConn groups on various reference group percentile tables, a printout listing individual students' scores for each item in the Battery, a card deck, and a layout describing the location of the items in UConn's data file.

Because we were participating in test development, the report of the COMP results lacked normative data from large national or university samples. Although the ACT-prepared table of senior norms for the "1979 Reference Group" lists 12 institutions (with 558 seniors) as participants, another table prepared by ACT to equate the Measurement Battery and the Composite Form indicates that only Andrews University, Iowa Wesleyan, Rochester Institute of Technology, the U.S. Military Academy and the University of Connecticut used the Measurement Battery. The other institutions were identified as having used the Composite form.

The freshman norms apparently were based on 140 freshmen at six institutions participating in the first field test in 1977 - Brigham Young, Colgate, Florida A & M, Mars Hill, Michigan State and Our Lady of the Lake.

Again, because of the developmental nature of the Battery, the ACT report to the University did not contain detailed information on reliability, internal consistency, and other item analyses expected in fully developed tests. For example, ACT reported that "sizable adjustments in mean scores for seniors were made due to systematic differences in level of rating by UConn faculty." A subsequent portion of the report which refers to the equating table for the Measurement Battery and the Composite Form includes this statement -- without further explanation: "Note that entering levels of achievement for UConn samples were higher than the reference group. Thus the UConn profiles are probably 10-15 percentile points higher than samples with comparable entering levels of achievement." I find it impossible to interpret this statement. At any rate, the UConn seniors' mean scores in seven areas were decreased by a correction factor of from -.55 to -6.46, and the total mean score was adjusted downward by -13.10. No explanation accompanied ACT's upward adjustment of our freshman mean scores in four areas by a correction factor of +.5 to +2.4 or of the freshman total score upward by +2.4. ACT provided no further details on the process of determining the correction factor for UConn or on the process or amounts of correction applied to the scores of other institutions in the COMP project. No adjusted scores were provided for individuals in either our senior or freshman group. Thus, we felt uncomfortable attempting to interpret the adjusted mean scores. These adjusted mean scores are used only in the attached Table 1, and not in any of the institutionally constructed tables.

ACT reported UConn's performance on COMP -- in mean scores on eight factors and total mean scores -- in what is attached as Table 1. In that Table both the University's freshman and senior adjusted mean scores were plotted on the norm percentile table for the UConn freshman group. We have superimposed on this table the "obtained", that is, the unadjusted mean scores, for both the freshmen and the seniors. The seniors' mean scores were higher than the freshmen on all factors. The greatest differences were on Using Science and on Clarifying Values. The smallest differences were on Using the Arts and on Speaking.

We were interested in seeing whether, for the 69 seniors, the general field of the student's major seemed to have some influence on the scores in the various outcome areas. The comments which follow are descriptive, not a statistical analysis.

Table 2A gives the area, sub-area and total unadjusted scores for senior majors in: (a) the social sciences, (b) natural sciences, (c) humanities, and (d) engineering. From the table, one can see that the performance of majors in the three liberal arts and sciences areas was similar, while the engineering majors performed at a noticeably lower level in the skill areas (writing and speaking) and in most of the areas involving the arts.

Tables 3A and 4A give the performance of the seniors in relation to total SAT scores (verbal and math combined) and in relation to cumulative grade point average. The number of seniors in the SAT score groupings of 1000 or lower was very small, only 14 out of 69, with the bulk of the scores in one category, 1010 to 1600. If you wonder why these particular score groupings were used, my response is simple -- they were used by ACT in its reports to us, apparently as a result of their effort to equate ACT and SAT scores. The result is not particularly useful for the University of Connecticut. We probably should have reconstructed the data with different score groupings and we may yet do so. In the meantime, about all that can be said about the relationship of COMP performance and SAT scores is that, with the exception of the one senior in the 700-790 SAT range, the mean COMP scores increased with each higher category of SAT scores.

The senior cumulative grade point averages were fairly evenly distributed in three of the ranges (2.00-2.49, 2.50-2.99 and 3.00-3.49). There was one senior with less than a 2.00 average and he/she had a higher total COMP score than the average score in the 3.00-3.49 GPA group. The seven seniors with cumulative GPA's of 3.50 and above had the highest mean total score but the area and skill mean scores were not always the highest. The students in the 2.00-2.49 GPA range clearly did have lower mean scores than did the students in the three higher GPA groups.

The unadjusted mean scores of the 45 freshman participants are given in Tables 2B to 4B.

In Table 2B, the mean scores are reported by the area in which the student expected to major. None of these groups is large enough to do anything more than observe that the natural science and humanities potential majors had total mean scores considerably lower than the social science majors. Students in Business and Engineering had total mean scores lower than the social sciences but higher than the other liberal arts and sciences areas. A mixed group from other professional schools had the highest mean score.

The SAT score grouping (Table 3B) shows progressively higher mean scores as the total SAT scores increased. As noted earlier, these specific cut-offs on SAT scores are not very useful for the University.

Since there was no University grade point average for the freshmen, the final table (Table 4B) grouped the freshmen by high school rank in class, in percentiles. The freshmen who had ranked below the 60th percentile had a clearly lower total level of performance while those who ranked at or above the 90th percentile had the highest total mean COMP scores. The freshmen who had ranked in the percentiles between the 60th and the 90th percentiles in their high school classes had total mean scores that were quite similar.

What was the student response to the Measurement Battery? Dr. McLaughlin prevailed upon over half of the senior participants to complete a locally designed questionnaire which solicited student views of "general education" as well as reactions to COMP. Figure 1 gives the responses to three questions on COMP. About 44% of the 43 seniors considered COMP an "inadequate" measure of their ability but almost as many (42%) considered COMP "adequate" in this regard. While 26% considered COMP "boring" and 23% felt it was "no more interesting than any other test", nearly 40% felt COMP was "interesting." We had been concerned about the time required for the Measurement Battery but the seniors were less bothered by this than we had anticipated. About 11% considered COMP "much too long", 41% felt it was "too long" but 48% considered the time "adequate."

The seniors in open-ended comments were quite supportive of the concept of use of various media ("good idea", "oral testing was fun", "in most cases... interesting and even stimulating", "slides and films kept our interest, but I hated the taping") but felt that some of the audio material (specifically one of the tapes) was poorly done and difficult to hear. The separate taping of the student responses was done in the University's Language Laboratory and several students felt inhibited by the experience ("I write intelligibly and speak gracefully in natural settings, but I fall apart when handed a microphone", "everything was excellent except the headset/microphone, which was distractingly detached from reality"). Other students considered the taping "interesting, fun", "very effective", and "excellent - few exams test this skill."

Comments on the Problem Solving component ranged from "too simplistic" to "an excellent way to evaluate creative and original thought" while the Clarifying Values exercise (which involved written responses) was considered "challenging, interesting, unusual" by one senior but another "felt like I was writing fiction. It wasn't real to me." The reactions to the stimulus materials for Functioning Within Social Institutions, Using Science and Technology, and Using the Arts also were mixed, although probably leaning most heavily toward the negative for the section on the arts ("I simply couldn't relate to this one" and "I didn't think this part hit the mark.")

On balance, I believe the seniors felt the experiment had indeed been interesting, that the use of various media was a good idea, but the stimulus materials were not universally considered good bases for assessing "outcomes" and abilities.

What about the reactions of the faculty who "scored" the responses? Because we were participating in a field test which we understood would contribute to the creation of national norms, it was quite understandable that ACT provided highly detailed instructions on how the faculty were to score the responses. I think it would be safe to say that the faculty felt the rigid instructions tended to favor simplistic responses (quantity in a listing, for example, rather than a weighting for the quality of the items in such a list). Although the ACT-specified level of acceptable response was disappointing to the faculty, they were enthusiastic about the idea of measuring general skills, analytical ability and problem solving capability.

Dr. McLaughlin feels that the acceptable standard of performance for "functioning in adult roles" as defined by this ACT instrument and the scoring rules mean either that the adult model is not sufficient or that the level of acceptable performance needs to be redefined.

According to Dr. McLaughlin, the faculty who participated would like to see some assessment similar to the concept underlying the Measurement Battery used for a sample of each senior class in the College of Liberal Arts and Sciences. Since the Measurement Battery is no longer available and since the Objective Test does not cover writing and speaking skills, the options available would be the ACT Composite Form, an assessment instrument from another test developer, or a locally designed instrument. The University has not fully discussed these options and under present financial constraints is unlikely to make a decision in the near future. One small-scale possibility for follow-up would be the re-testing of the freshman participants who are registered as seniors in the Spring 1983 semester.

The University of Connecticut experiment with using the ACT/COMP Measurement Battery with a small group of freshmen and seniors has been interesting and worthwhile. We have learned more about the problems of assessing outcomes and skills than we have about either the actual skill levels and abilities of our students or about the impact of general education on the development of such skills and abilities. We will continue to search for answers to these questions.

Attachment A

From: COMP Annual
Report, 1978

TABLE 1
Subscores Derived from the COMP/ACT Measurement Battery

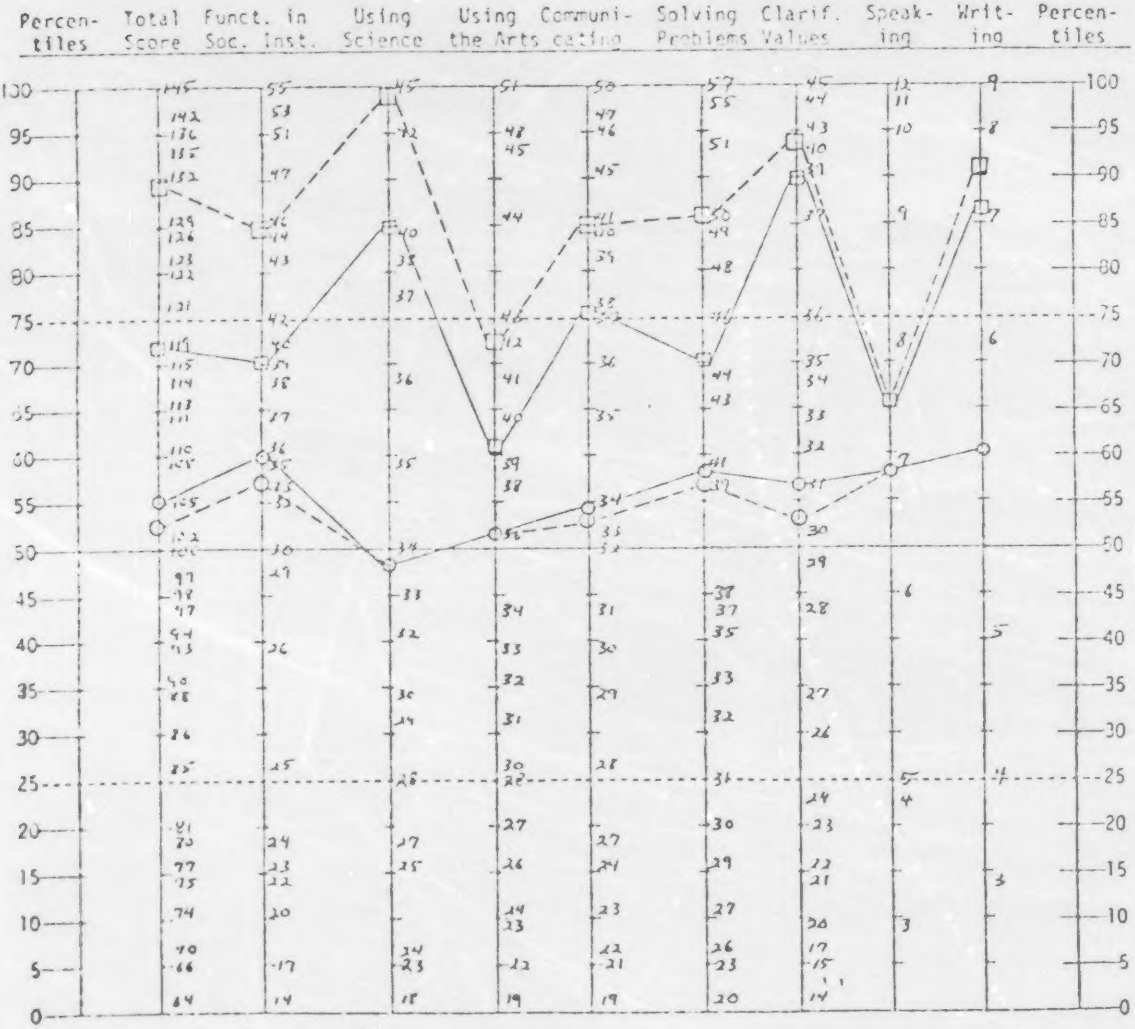
<table>
<tr><th></th><th>1. FUNCTIONING WITHIN SOCIAL INSTITUTIONS</th><th>2. USING SCIENCE AND TECHNOLOGY</th><th>3. USING THE ARTS</th></tr>
<tr><td rowspan="3">4. COMMUNICATING</td><td colspan="3">7. Speaking: ability to establish a human relationship with an audience, and concern about delivery (animation, fluency, poise) as well as discourse (organization of ideas, examples, detail). This score is based on nine minutes of taped responses to questions dealing with social institutions, science and technology, and art, for which advanced preparation is allowed.</td></tr>
<tr><td colspan="3">8. Writing: ability to send information to a particular audience with a focus on persuasion in which points are developed in a clear and controlled way and correct and lively use of language is demonstrated. This score is based on sixty minutes of writing to produce three letters.</td></tr>
<tr><td>9. Communicating about Social Institutions: ability to send and receive information (including numeric and graphic material) related to activities and institutions which constitute the social aspects of a culture.</td><td>12. Communicating about Science and Technology: ability to send and receive information (including numeric and graphic material) related to the scientific/technological aspects of a culture.</td><td>15. Communicating about the Arts: ability to send and receive information (including numeric and graphic material) related to the artistic aspects of a culture.</td></tr>
<tr><td>5. SOLVING PROBLEMS</td><td>10. Solving Social Problems: ability to define problems of functioning within social institutions and select approaches to solve problems, generate solutions, collect information, check logical consistency, select a good solution, and evaluate the process by which a problem was solved.</td><td>13. Solving Scientific and Technological Problems: ability to define problems related to scientific products and the use of technology in a culture, select approaches to solve problems, generate solutions, collect information, check logical consistency, select a good solution, and evaluate the process by which a problem was solved.</td><td>16. Solving Artistic Problems: ability to define problems related to art and its expression and use in a culture, select approaches to solve problems, generate solutions, collect information, check logical consistency, select a good solution, and evaluate the process by which a problem was solved.</td></tr>
<tr><td>6. CLARIFYING VALUES</td><td>11. Clarifying Social Values: ability to identify one's own social values and those major values and issues faced by others in daily adult life in one's own and other cultures, understand how values develop, and analyze the implications of decisions made on the basis of those values.</td><td>14. Clarifying Scientific and Technological Values: ability to identify one's own scientific/technological values and those major values and issues faced by others in daily adult life in one's own and other cultures, understand how values develop, and analyze the implications of decisions made on the basis of those values.</td><td>17. Clarifying Artistic Values: ability to identify one's own artistic values and those major values and issues faced by others in daily adult life in one's own and other cultures, understand how values develop, and analyze the implications of decisions made on the basis of those values.</td></tr>
</table>

TABLE 1

Local Norms for Univ. of Conn. Comparison Group: 44 Freshmen
(grade level and program(s))
Date Tested Fall 1974

COMP/ACT MEASUREMENT BATTERY: (Form II)

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to the others tested at your institution. (For example, if your total score was 99 you scored above almost 50% of those in this comparison group.)



□—□ = Adjusted means for 68 UConn Seniors
○—○ = Adjusted means for 45 UConn Freshmen
□- -□ = Obtained means for 68 UConn Seniors
○- -○ = Obtained means for 45 UConn Freshmen

TABLE 2A and B

The University of Connecticut

Office of Institutional Research

Mean Scores on ACT-COMP Grouped by Fields of Major

Part A | Part B

	Mean Scores of 69 Seniors					Mean Scores of 45 Freshmen							
	Total Group	Social Science	Natural Science	Humanities	Engineering	Total Group	Social Science	Natural Science	Humanities	Engineering	Business	Other[1]	Maximum Score
Total Score	131.2	133.8	136.3	128.2	121.5	102.7	110.8	85.2	96.0	104.8	100.3	122.5	240
Outcome Areas													
Functioning within Social Institutions	45.5	46.7	46.9	44.3	42.5	33.1	36.0	25.7	28.5	31.2	31.5	45.0	80
Using Science and Technology	43.7	43.4	45.8	42.2	42.3	33.6	35.7	30.8	31.5	35.8	32.7	36.3	80
Using the Arts	42.0	43.7	43.6	41.7	36.8	36.0	39.1	28.7	36.0	37.8	36.1	41.3	80
Communicating	40.6	41.1	41.6	39.9	38.8	33.3	34.5	31.7	31.3	33.8	33.1	35.3	72
Solving Problems	49.9	51.0	52.3	48.9	45.2	39.2	43.9	31.8	35.0	39.4	37.6	49.0	96
Clarifying Values	40.7	41.6	42.5	39.4	37.5	30.2	32.5	21.7	29.8	31.6	29.5	38.3	72
Skill Areas													
Speaking	7.5	8.0	7.5	7.3	6.8	6.9	7.0	6.3	7.5	6.6	7.3	6.8	12
Writing	7.6	8.1	8.0	8.0	5.5	5.6	6.2	4.8	6.0	5.8	5.1	6.3	12
Sub-Scores													
Communicating about Social Institutions	13.2	13.9	13.3	13.1	12.4	10.1	10.1	9.8	10.3	9.8	10.0	12.5	24
Solving Social Problems	17.3	17.3	18.4	17.5	15.5	11.8	14.1	8.2	8.5	9.8	11.1	17.5	32
Clarifying Social Values	14.9	15.5	15.2	13.7	14.6	11.2	11.8	7.7	9.8	11.6	10.4	15.0	24
Communicating about Science and Technology	13.9	13.3	14.6	13.3	14.3	11.5	11.8	11.3	10.5	12.4	11.6	10.5	24
Solving Scientific and Technological Problems	15.8	15.9	16.5	15.2	15.2	12.4	13.5	11.8	11.0	13.2	11.9	14.0	32
Clarifying Scientific and Technological Values	14.0	14.1	14.7	13.7	12.8	10.1	11.4	7.7	12.5	10.2	9.2	11.8	24
Communicating about the Arts	13.4	13.9	13.6	13.5	12.1	11.4	12.5	10.5	10.5	11.6	11.5	12.3	24
Solving Artistic Problems	16.8	17.8	17.4	16.2	14.6	14.8	16.4	11.8	15.5	16.4	13.7	17.5	32
Clarifying Artistic Values	11.8	12.0	12.6	12.0	10.1	9.6	10.2	6.3	10.0	9.8	10.0	11.5	24
n =	69	21	22	13	13	45*	11	6	4	5	11	4	

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[1] Nursing, Pharmacy, Education, Agriculture.

*Includes four with undecided major.

TABLE 3A and B

The University of Connecticut
Office of Institutional Research
Mean Scores on ACT-COMP Grouped by SAT Scores

Part A | Part B

	Mean Scores of 69 Seniors					Mean Scores of 45 Freshmen				
	Total Group	SAT Score Groupings				Total Group	SAT Score Groupings			Maximum Score
		700-790	800-890	900-1000	1010-1600		800-890	900-1000	1010-1600	
Total Score	131.2	125.0	108.3	123.4	134.8	102.7	77.0	88.3	107.5	240
Outcome Areas										
Functioning within Social Institutions	45.5	45.0	36.2	42.9	46.9	33.1	21.5	25.0	35.4	80
Using Science and Technology	43.7	43.0	37.0	40.1	49.9	33.6	27.5	30.4	34.9	80
Using the Arts	42.0	37.0	35.7	40.4	43.0	36.0	28.0	32.9	37.2	80
Communicating	40.6	34.0	32.2	37.4	42.0	33.3	25.5	29.4	34.5	72
Solving Problems	49.9	51.0	41.7	46.4	51.3	39.2	30.5	31.6	41.5	96
Clarifying Values	40.7	40.0	35.0	39.6	41.5	30.2	21.0	27.3	31.4	72
Skill Areas										
Speaking	7.5	6.0	7.0	7.9	7.5	6.9	5.0	6.3	7.1	12
Writing	7.6	7.0	6.3	7.3	7.7	5.6	4.0	4.9	5.8	12
Sub-Scores										
Communicating about Social Institutions	13.3	14.0	9.0	13.1	13.7	10.1	7.0	8.5	10.8	24
Solving Social Problems	17.3	17.0	14.3	15.0	18.0	11.8	8.0	8.1	12.7	32
Clarifying Social Values	14.9	14.0	12.8	14.7	15.1	11.2	6.5	8.4	12.1	24
Communicating about Science and Technology	13.9	9.0	11.3	11.4	14.6	11.5	7.5	10.0	12.2	24
Solving Scientific and Technological Problems	15.8	17.0	12.8	15.1	16.2	12.4	11.0	10.6	13.0	32
Clarifying Scientific and Technological Values	14.0	17.0	12.8	13.6	14.1	10.1	9.0	11.0	10.1	24
Communicating about the Arts	13.4	11.0	11.8	12.9	13.7	11.4	11.0	10.9	11.5	24
Solving Artistic Problems	16.8	17.0	14.5	16.3	17.1	14.8	11.5	12.9	15.5	32
Clarifying Artistic Values	11.8	9.6	9.3	11.3	12.2	9.6	5.5	9.1	9.8	24
n =	69	1	6	7	55	45*	2	8	33	

*Includes two without SAT scores.

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TABLE 4A and B

The University of Connecticut
Office of Institutional Research
Mean Scores on ACT-COMP

Part A | Part B

	Mean Scores of 69 Seniors Grouped by Grade Point Index						Mean Scores of 45 Freshmen Grouped by High School Rank in Class						
		Cumulative Grade Point Index											
	Total Group	1.50-1.99	2.00-2.49	2.50-2.99	3.00-3.49	3.50 % above	Total Group	Below 60th %ile	60-69th %ile	70-79th %ile	80-89th %ile	90-99th %ile	Maximum Score
Total Score	131.2	134.0	118.1	135.8	132.5	148.4	102.7	73.5	94.8	98.9	98.5	111.0	240
Outcome Areas													
Functioning within Social Institutions	45.5	52.0	40.8	46.5	45.9	52.7	33.1	18.5	31.2	31.7	30.8	35.8	80
Using Science and Technology	43.7	43.0	39.6	45.8	43.4	50.0	33.6	25.5	33.6	32.0	34.3	35.3	80
Using the Arts	42.0	39.0	37.7	43.5	43.3	45.9	36.0	29.5	30.0	35.1	33.4	39.9	80
Communicating	40.6	45.0	36.1	41.6	42.0	45.1	33.3	28.5	29.6	31.4	32.2	35.6	72
Solving Problems	49.9	47.0	44.9	51.8	50.4	57.1	39.2	26.0	36.4	38.0	38.1	42.2	96
Clarifying Values	40.7	42.0	37.2	42.5	40.2	46.1	30.2	19.0	28.8	29.4	28.2	33.3	72
Skill Areas													
Speaking	7.5	11.0	6.4	7.5	7.8	8.9	6.9	7.5	4.4	6.7	6.3	7.6	12
Writing	7.6	7.0	6.7	7.6	8.0	8.7	5.6	4.0	5.0	5.6	4.9	6.3	12
Sub-Scores													
Communicating about Social Institutions	13.3	16.0	11.6	13.5	13.8	15.1	10.1	8.5	9.2	10.6	9.7	10.8	24
Solving Social Problems	17.3	19.0	15.5	17.6	17.5	21.0	11.8	5.5	11.6	10.7	11.5	12.3	32
Clarifying Social Values	14.9	17.0	13.8	15.4	14.3	16.6	11.2	4.6	10.4	10.4	9.6	12.6	24
Communicating about Science and Technology	13.9	14.0	12.5	14.5	14.3	15.0	11.5	8.0	11.8	9.1	11.8	12.4	24
Solving Scientific and Technological Problems	15.8	14.0	14.2	16.2	16.1	18.6	12.4	9.5	11.8	12.7	12.7	13.1	32
Clarifying Scientific and Technological Values	14.0	15.0	12.9	15.0	13.0	16.3	10.1	13.0	5.0	10.1	9.8	10.4	24
Communicating with the Arts	13.4	15.0	12.0	13.5	14.0	15.0	11.4	12.0	8.5	11.7	10.7	12.3	24
Solving Artistic Problems	16.8	14.0	15.2	18.0	16.8	17.6	14.8	11.0	13.0	14.6	12.9	16.8	32
Clarifying Artistic Values	11.8	10.0	10.5	12.0	12.5	13.3	9.6	6.5	8.4	8.9	8.8	10.8	24
n =	69	1	19	22	20	7	45*	2	5	7	10	18	

*Includes 3 without class rank.

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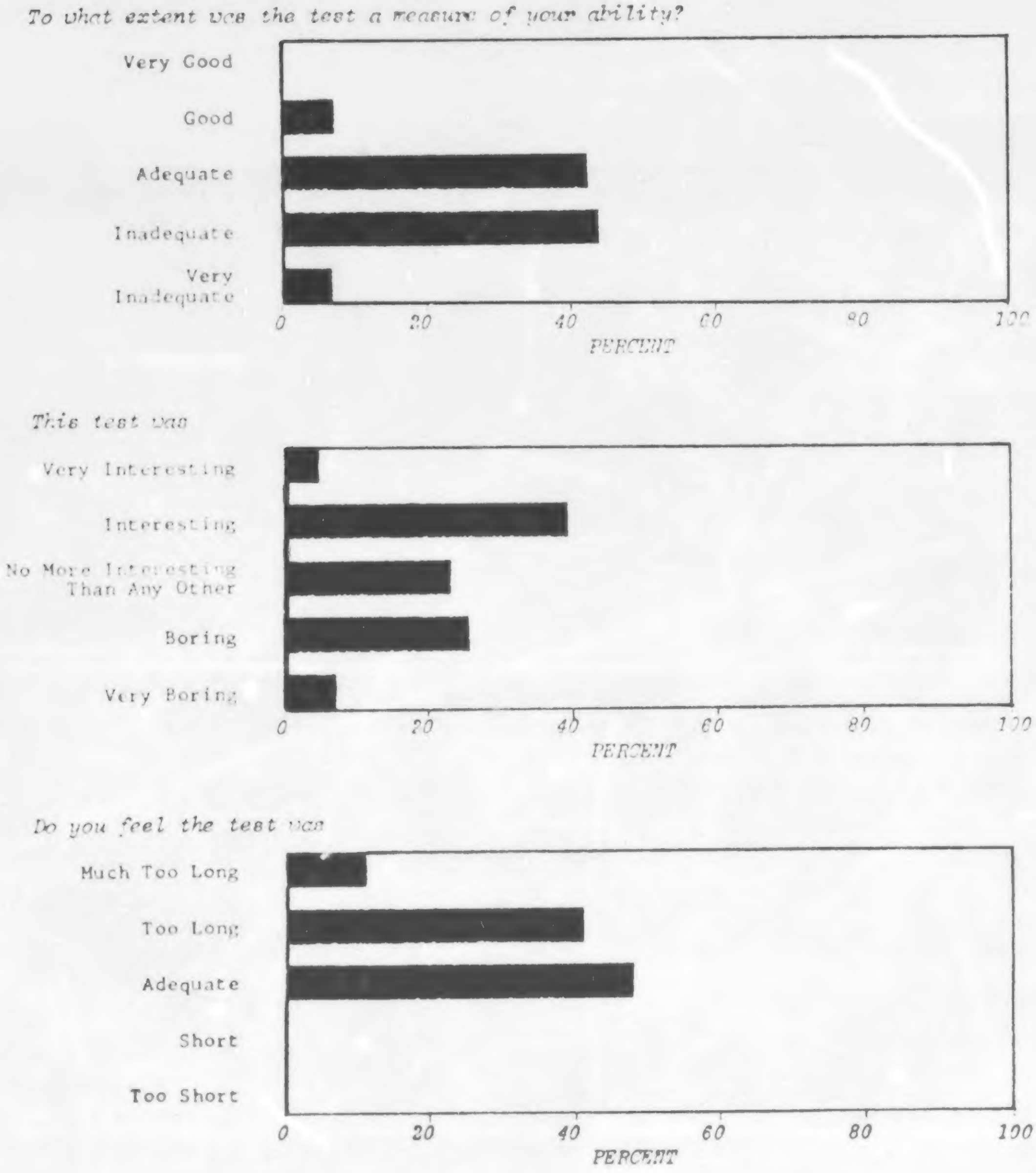
FIGURE 1

REACTIONS OF SENIORS TO ACT - COMP, SPRING 1979



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MOVING BEYOND PLANNING BASED ON EXTRAPOLATION IN A PERIOD OF RADICAL CHANGE

Donald G. Hester
Paul Wing

INTRODUCTION

There is a saying among sailors that every seventh wave is larger than the others. The Bristol Channel on the western side of England is famous for the Seven Bore, a surging wave that grows in size as it proceeds up the river, pushed by the rising tide. Occasionally there are giant waves created by eruptions or earthquakes which travel over thousands of miles of ocean.

There is a growing recognition among planners that waves are important in social organization and systems as well as in physical systems. J.W. Forrester was one of the first to explore this approach to planning. In 1971 he applied the wave idea to the study of population. His concept of systems dynamics has been adopted and adapted by many others as in recent work of Mass and Senge (1981) which deals with long and short waves in the economy. This theme was anticipated by Jonas Salk (1973) in his Epoch B theory of the future. A more popular expression of wave effects in society can be found in Alvin Toffler's Third Wave (1980). He has suggested three major "waves" in human society over the past few hundred years: the agricultural, industrial, and information revolutions.

The central theme of this paper is that wave patterns abound in education, and that instead of linear extrapolation of isolated variables, a different model is needed for planning. A multiple stranded helix with interactive nodes, like the D.N.A. structure would be more appropriate. It is obvious enough that on any parabolic curve, over short periods there are places where data suggest linear trends and relationship. Planners, however must recognize that if such a curve is not identified, and when interacting variables are not well understood, the chances for error are high if the curve changes its direction "unexpectedly."

We believe the 1980's will be a critical decade for education because of the convergence of many important factors. The computer has made possible the processing of large amounts of data, and graphics is now making possible the easy display of masses of information. This capacity offers both institutional and system planners an unparalleled capacity to process information. Paradoxically, it is also creating the need for people who can synthesize and work comfortably with large systems as opposed to small segments of systems as in the past, generalists rather than specialists.

The Land-Grant Institutions - A Wave Effect

The Morrill Act of 1862 was generous in its provision: some 17.5 million acres of land were ceded by the federal government to fund the grants that were in time to lead to the Land-Grant Institutions of today. Eldon L. Johnson (1981) has noted that the Land-Grant colleges "supply eight out of the ten largest undergraduate campuses in the United States and enroll more than one-seventh of all the university students" at the present time. The first thirty years Johnson portrays as ones of struggle. It was the arrival of "tested principles and verifiable knowledge that came from research" which Johnson suggested made the difference. Put another way, other variables were necessary to enable the Land-Grant institutions to take off. Their growth was not linear but parabolic and as Forrester would put it, with the rate of change of size being connected to other factors.

The Decade Ahead

Waves can drop as well as rise when conditions are right. This is obvious, but operationalizing it into a forecasting model or a planning strategy in a particular situation can be difficult. This is certainly the case with education: the decade we are now in promises many changes. Growth has characterized American education through much of its history, particularly in the period since World War II. The sixties saw spectacular growth, with a slowing up in the seventies. The present situation may be characterized as one of steady state (See for example Rowse, 1981), at the peak of a wave.

In the halcyon days of growth not much thought was given to demographic decline. Whether we needed all the plant that was built is questionable but now academic; the reality of maintaining it and using it, however, is very real. Fortunately, in this time of change, forecasts have been made on fairly sound foundations and received a lot of attention. It is well known that the traditional student will be in short supply over the next fifteen years, with perhaps as many as 40 to 50 percent fewer of them in certain sections of the Northeast. Financial resources will probably continue to be under considerable pressure. It will no longer be possible to offset the effects of inflation by expansion. For many influential people, education is no longer center stage. These are some of the more obvious issues facing educational planners. Others should also receive attention and will be discussed.

It's hardly surprising given the present uncertainty that futuring is a growing field in interest that now enjoys full academic standing at some universities. The reality is that federal and state government, institutions, and commerical enterprises face a future of growing complexity. There is a growing network of interlocking interests, commercial, government, scientific, and cultural, across the world. Closed systems approaches to planning which may have been effective in the past, may be dangerous in these complex environments in the future. As new ideas and trends form in one arena, ripples and waves rise and fall in other arenas. When one adds a few unexpected cross winds for good measure, plotting a course becomes very difficult indeed.

EDUCATIONAL FUTURES - CONFLICTING PERSPECTIVES

Difficult as it may be to plot a course for education, it is certainly not impossible. The environment may seem overpowering, but it can be influenced. It is possible to form a sense of the shape of the future, even to influence the shape it will take. A good example of anticipating the problems of the eighties was testimony given by John R. Silber to the Court of Massachusetts back in 1975:

> The problem of paying for higher education in an era of inflation is further complicated by the decline in live births since 1960. Nationally, there were 4.3 million live birth in 1960, but only 3.1 million in 1973. Is there anyone in education administration who believes that this 26.3% decline will not be reflected in empty desks, empty classrooms, empty schools and ultimately in academic ghost towns? (p. 5)

Silber identified the two central issues of inflation and demographics. He also foresaw the consequences clearly enough. The demographic issue has continued to receive attention and was the focus of a double feature in Change (1980) last year. Fred Crossland took a position similar to that of Silber and forecast a net fifteen percent decline in enrollments between 1980 and 1995 after allowing for counter measures. Carol Francis (1980), in marked contrast, thought strategic planning would even make it possible to achieve a 3.5 percent growth through the eighties. The New York State Education Department has taken very seriously the enrollment issue, and has developed a very extensive forecasting model (Rowse, 1980), to help understand the possibilities. Their work shows that without major initiatives by campuses and others, significant declines will occur.

There are clear indications that campuses are responding to the challenge of demographics presented by Crossland and others. Declines projected several years ago have so far been avoided through campus initiatives. For example, increased retention and more part-time and older students, are helping offset declining numbers of high school graduates. Our point is that it is important to take seriously both the potential decline and the possibility of avoiding decline through strategic planning.

One thing is clear: effective planning will increasingly demand a widening base of information and analysis. This is the only way that the emerging complexities can be dealt with adequately.

State Level Planning

State Master Planning was one of the important developments of the 60's and 70's. It is, however, necessary to realize that this innovation is still at an early stage of development. State planning will require greater resources if it is to be a really effective instrument of change and response to the environment in the decade ahead. There is a need for better use of information, better communication, and more hard-nose priority setting of this approach if it is to live up to its potential.

Three Thousand Futures

The Carnegie Council offered an interesting approach to planning for the next twenty years for higher education in its report, Three Thousand Futures (1980). The report lists a set of negative expectations or fears for the future, followed by a list of hopes in the outlook of others. The question is posed: which future will occur? Their principal suggestion is that each institution will have a different future. The differences will be determined by the extent to which institutions identify the possibilities and then address them in their own unique ways. The belief is expressed that the future, and by inference the environment, is influenced by our actions:

> The purpose of all policy is to change the future and, thus, how we see the future affects how we seek to change it. Policies adopted by both public and private bodies, based on the views they hold, can affect the future for better or worse. (p. 6)

Institutional, state, and federal planning should be predicated upon this axiom.

The report gives central significance to enrollments because higher education is "largely an enrollment-driven system." Three other dimensions are also identified: equality of access, innovation, and governmental impact. The 1960's were characterized as the search for research university status; the 1970's as the quest for excellence; and the 1980's projected as the struggle for survival. The Council then encapsulated the changing trends further: "Institutions were trading up; now they are trading down." It is easy to see this is likely to lead to a clash of interests, the desire to preserve status and excellence on one side, and the need to adapt for survival on the other. The report suggested that higher education was in good shape at the end of the seventies and that although the system can expect to struggle for the next decade-and-a-half, it should recover strongly at the turn of the century. There will be, they expect, a new surge from young faculty when the dip is past, which can be expected to bring a new vitality to higher education early in the twenty-first century.

Carnegie contended that 95 percent of all campuses experienced significant change in the 1970's and projected continued change in the future. Change is the central theme of Three Thousand Futures. Change is also the reason that realistic, periodic goal-setting will be an essential part of the planning process for colleges. The eventual outcome of the planning process will be strategies and programs to lead campuses through the external forces and environmental and contextual changes of the 80's.

Carnegie regards demographic changes as the one certainty that can presently be identified. Although we agree that significant demographic change will occur, we believe other changes are certain to occur as well. Identifying these changes however, is not always easy. Careful observation of trends and patterns and relationships among statistics and situations can lead to important insights about the future. On the other hand, as Carnegie points out, political responses must also be considered. From this we conclude caution is necessary in planning, and that continuous planning (for example, the "rolling" approach used by State University of New York) should be used.

Planning must also search for cost-effective approaches to strategies. For example, Carnegie suggests the consideration of consortia and discontinuance of "unnecessary" programs. The essential point, of course, is that financing will be a central topic in the next decade. The demands on leadership will be considerable and Carnegie has suggested longer terms of office for presidents in the hope of avoiding short term expedience in policy implementation. It is Carnegie's conviction that coordinated action at the campus level, backed by private support, is the best way to unlock the future successfully. Carnegie, of course, also sees important federal and state roles, and believes that the State role will increase in importance as time passes.

The "Jugular Vein" Model of Planning

Victor Baldridge (1980) has taken the "uncertainty" principle further than Carnegie did in its report and offered his "Jugular Vein Decision" model for institutional survival. He does not have confidence in grand-scale master planning and believes shorter-range critical decisions are more important. He pointed to the demise of student power and the decline of faculty influence both at the campus-wide and department level as examples of long-term strategies in the face of a shift in power to central administrations and faculty unions. Baldridge characterizes this shift as a rise in "administrative imperialism."

Baldridge argues that the future is uncertain and that what is needed is institutional flexibility and this is best obtained from institutional muscle and responsiveness. This comes, he argues, from selecting the best people as administrators who can and will make "jugular vein decisions." Particularly important are the ones aimed at partnerships within the institutions and that are creative responses as the situation unfolds.

We recognize that Baldridge's advice to strengthen partnership, improve student services, recruitment, admissions, marketing, and retention makes good sense. It also makes good sense to choose strong leaders, because good decision-making is highly important. However, we don't agree that sailing by the seat of one's pants is the best approach to the future. Technology invaded sailing a way back with favorable results, and similar possibilities exist now in planning and administration. Good futuring and intelligent planning are we believe, fundamantal to the future survival and prosperity of education.

FUTURE STUDIES IN A BROADER CONTEXT

Futuring has been around a long time and has been a traditional part of many cultures. Anyone who attended the World Future Society, "First Global Conference on the Future," at Toronto in 1980 would have seen that futuring is important in many minds. The theme -- Thinking Globally - Acting Locally -- describes the mood. The presentations made it clear that the world is changing very rapidly. In contrast to the demographic depression that faces American higher education, world population is projected to double, perhaps triple, in the next thirty years. The conference, both as a recognition and a projection of the future, sees the shift from East-West to North-South as a major future trend, with Africa, South America and Southern Asia emerging as major world forces.

It is important in the longer run to look beyond demographics and fiscal pressures, and for education to recognize its central place in solving the problems which confront the world. In one of the footnotes to the Carnegie Report (1980) there is the fascinating observation that of sixty-six institutions in the western world surviving from 1530, sixty-two are universities (p. 9). Fifteen years of demographic depression should not be allowed to damage or blunt awareness of the contribution that education has made and continues to make to all aspects of life. Endeavors toward institutional survival should have a clear sense of the purposes and accomplishments of higher education. If colleges can continue to serve these objectives, the growth of the sixties could well be repeated in the first two decades of the next century. This responsibility to the future should not be forgotten.

Education has taken notice of the business world with respect to marketing and promotion. Another useful protocol is futuring. Many companies employ people specifically to gather information and data upon which forecasts and change strategies can be built.

Institutional planners could profitably review the literature of futuring and keep up with developments in this growing field. Four broad approaches will be outlined below, each based upon particular perspectives on the future. We do not suggest that one is necessarily better than the others. Each has strengths and weaknesses. Perhaps a combination of perspectives is the best way of building a broad picture of the future.

Positive Extrapolist

Sometimes authors' acknowledgements add important perspectives to a book. Certainly this is the case with Herman Kahn et al (1976). The broad sweep of The Next Two Hundred Years is breath-taking. There are marked similarities to Toffler's Third Wave (1980) in the simple historical assumptions that are made. The agricultural revolution is cast roughly into a 10,000 year time span. The present period, the industrial revolution, now 200 years old, is seen as half completed. The bicentennial year of printing was taken as the springboard for a two-hundred year leap into the future.

In effect the authors develop a 10x4 matrix of the future from which their arguments are constructed. Ten major elements (e.g., technology, resources, and industrial development) are outlined through four basic perspectives of the future. The four views are: Convinced Neo-Malthusian, Guarded Pessimist, Guarded Optimist and Technology-and-Growth Enthusiast. Kahn and his colleagues believe there is little reason for the Neo-Malthusian cries of doom and that this perspective is based on too narrow a view of the evidence. They also believe the fears of doom arise from a failure to correlate the main areas of data that are relevant to a particular topic. They argue that to avoid a distorted assessment of the future, one must carry forward projections over broad areas and also consider forces acting upon them. They worked six areas: population, economic growth, energy, raw materials, food and pollution. Ten important forces in industrial societies are also identified that must also be taken into account, e.g., availability of capital, technology transfer, tourism, import substitution, and foreign aid.

The conclusions in the book are based on a complex set of projections carried forward for two hundred years. The impression is created for the reader that the authors have become very familiar with the world from a future perspective. The consequence is that current issues that attract the attention of many people are placed in a wider frame of reference. It's rather like leaving a village or town where the buildings have dominated one's attention to find a new vantage point looking down from a mountain or an airplane. From the new place the structures appear small and relative to a large whole; the broad picture, of course, can be more clearly seen.

Another similarity with Toffler's approach is the argument that whatever the political ideology of an industrial country, industrialization passes through four distinct phases. These phases represent different levels of economic growth and activity. The advanced nations, later in this century and early in the next, will emerge as super-industrial economies and then later as post-industrial societies. With these kinds of changes taking place, many different transitions are happening simultaneously. The changes affect basic needs for energy, food, and resources in the environment as a whole.

Kahn's view of the future with its changes and cycles is consistent with our concern for wave phenomena. Not only is it reasonable to expect waves and cycles, it should be possible with better data and knowledge to define and predict them.

Another element in the Kahn argument is that as industrialization advances, so does the demand for science, technology, and industry shift. The process, they assert, builds in factors which compensate for the random and by-product negative outcomes that occur along the way. Institutions and cultures will undergo changes in the process of the industrial development. They can be expected to change even more as these future transitions occur.

American society will be one of the first to move into the post-industrial era. Change in this context will be a challenging area of concern for organizational theorists. Organizations will probably need to decentralize and introduce technology to facilitate decision-making on the basis of knowledge, rather than organizational position. The bureaucratic model has served the industrial period well but may not be suitable in the post-industrialization era.

Kahn et al suggested there are a variety of tendencies at work in the process of moving from an industrial to a post-industrial society. They identified sixteen tendencies, many of which will prompt crises for technology from time to time. Some of these crises will be well handled; others poorly. Those which are handled poorly may result in war, famine, plague or civil disorder. Kahn's two hundred year look into the future visualizes a radically different world from today, a world perhaps of twenty billion people and a Gross World Product of $300 trillion. Perhaps this kind of growth sounds staggering, but it was not based on present extrapolation of exponential growth, the premise of the book is that many projection curves will level out in the next century.

The Hudson Institute data suggest that the problems the world faces are largely the product of success, not failure. The conclusion was drawn that there is a bright future for the world in terms of resources and capacity to use them, for a very long while to come.

We have dwelt at some length on the Kahn view of the future because all four perspectives we have identified are addressed to some extent by the data represented. The four areas they choose correspond with our conception fairly closely. Another reason for our attention is that we believe the aggregation, analysis, and synthesis of large data sets will be the key to effective planning in the future. The world system is likely to coordinate and interlock even more in the future, and so will the higher education system. We believe models and quantitative analysis will be increasingly important in decision-making. Analysis of trends must therefore take into account the broader contextual spectrum in which they operate. Fortunately, information processing is likely to be able to match the demand for greater sophistication. Advances both in computer hardware and software are highly probable for sometime to come.

There is yet another aspect of importance which emerges from the Kahn study. The early stages of the industrial revolution were predicated on specialization. The influence of this fact was all pervasive, affecting education, institutions, organizational forms, the entire culture. The post-industrial society may well produce a reversal of many of these patterns. Instead of specialization by the masses, a new kind of generalism may be essential, with a relatively small elite of specialists to sort out problems that do not yield to packaged procedures. The great need of the future could easily be a new kind of liberal education that incorporates the new electronic technologies and information processing tools. Such an education would enable its possessors to integrate information across a variety of disciplines and cope effectively with an increasingly complex world.

Negative Extrapolist

The negative extrapolist position corresponds with what Kahn et al describe as the Neo-Malthusian view of the future. Population, food supply, basic resources, pollution, and other concerns are extrapolated. Extrapolation of this kind leads to a picture of the future in which anxieties over well being, even survival, are warranted. One such project was The Global 2000 Report (1980) to the Subcommittee on International Economics of the Joint Economic Committee of the Congress of the United States. Trends were projected to the year 2000 and "a world dying and desolate, the result of the past, present, and prospective follies of its people, is envisioned." It is important in our opinion, when seeking to understand and reconcile the various perspective of futurolgy (and for that matter of other things as well) to recognize the main theme of each view. Malthus became a legend as a prophet of doom, but few recognize he changed his perspective later in life. Similarly Global 2000 is not a prediction, but a statement of what will happen if trends are allowed to continue.

Former President Jimmy Carter, on entering office in 1977, commissioned an interagency approach to long-range planning. He clearly recognized that global concerns are our concerns; the United States cannot go it alone. The report, when it was published last year, was well received, both at home and abroad. The report was claimed to be the first of its kind at a governmental level; certainly in terms of its range and scope, it is a milestone in world government.

Three central problems were identified: population growth, food supply, and energy requirements, along with a number of other lesser issues. Gus Speth summarized the report:

> The conclusionsof the Global 2000 Report indicate the potential for deepening global problems over the next two decades if policies and practices around the world continue as they are today. The next 20 years will be an increasingly crowded world, containing more than 6 billion human beings by 2000. It could be a world in which growing numbers of people are suffering from hunger and deprivation; where loses of croplands and forests are mounting while human numbers and needs for capita supplies of fresh water, timber and fish are diminished; where degredation of the earth's air and water is accelerating; and where plant and animal species are vanishing at rates without precedent. Even now, some 800 million people live in conditions of absolute poverty, their lives dominated by hunger,

> ill health, and the absence of hope. By 2000, if current policies remain unchanged, their number would grow to more than one billion. (The Global 2000 Report, p. 5).

So the report is not a prediction, but a projection of present trends to their logical consequences if no action is taken. There is nothing inevitable about these forecasts, as the former Secretary of State Muskie observed, although they are a call for action:

> ...the study is another chilling reminder that our common future depends on our common success, here and throughout the complex of relations known as the North-South dialog. We must work together to raise food production to diversify energy sources and to use energy and other resources more efficiently to protect our common environment, to restrain population growth, to deal effectively and equitably with mounting deficits, and to keep an open system of trade. (The Global 2000 Report, p. 17).

Increased capacity for data processing and analysis is necessary because of the magnitude and complexity of the problems. Another reason is the time-frame that is hidden in these trends. It took thirty thousand years for the world population to reach a billion people. In this century, the population may reach five or six billion. Growth of a whole variety of other variables is also exponential and certainly warrants considerable attention. Delays in decision-making are more consequential than ever before; we do not have the luxury of time to reflect before actions are taken.

Colleges and universities will not face a demographic explosion in the next two decades, but they do need to face social and world change. It is reasonable to expect these trends to continue and probably accelerate which will increase their impact on college programs.

Romanticist

Max Lerner in his forward to Marilyn Ferguson's The Aquarian Revolution, said she is the bearer of good news, that the world is on the edge of a "knowledge revolution that shows signs of a breakthrough." Ferguson believes that a convergence is taking place between many disciplines and that this is a part of a wider pattern toward synthesis of ideas and actions. The social concern of the 1960's and the consciousness movements of the 1970's are likely to result in a historic synthesis, in her view. She sees a new phenomena: societal change taking place as a result of inner change.

Central to the change process for Ferguson, are the paradigm shifts (Kuhn, 1962) that reshape society. At their base she argues was at first a leap of intuition. This leap is followed by supporting work usually of an empirical nature which leads gradually to mass acceptance of the new perspective. It is not hard to see that technology could easily feed such a process by, for example, the application of brain research and biofeedback to education and communication. A new understanding of social change process is possible in her view and it is possible to conceive of accelerating change processes at work in society in the future. The Aquarian Conspiracy is itself claimed as a paradigm shift:

> The paradigm of the Aquarian Conspiracy sees humankind embedded in nature. It promotes the autonomous individual in a decentralized society. It sees us as stewards of all our resources, inner and outer. It says that we

> are not victims, not pawns, not limited by conditions or conditioning. Heirs to evolutionary riches, we are capable of imagination, innovation, and experiences we have only glimpsed (p. 29).

Central to her thesis is the assertion of the great thinker Pierre Teilhard de Chardin. He was convinced that the mind as well as the body is in the evolutionary development patterns of life. The process has, he thought, involved successive reorganizations of the mind throughout history. Many great thinkers and writers have contributed to the march. For Ferguson, the last great frontier is the mind, the integration of both brain hemispheres in a raised level of consciousness. Health, learning, the workplace, and values will all be subjected to the process of change in her thesis. She believes the paradigm shift that she detects is taking place in society silently across the world. It is not a political movement, but part of the very soul of humanity, part of the evolutionary process.

Transformationalist

Both Robert Theobald (1976) and Alvin Toffler (1980) recognize both positive and negative extrapolation trends in the world economy and argue for radical change. Theobald's view is that we are moving through a time of fundamental cultural change and that it is unrealistic to think there can be a bright industrial future with essentially unchanged values. New policies are needed to address income distribution, health, justice, education, and unemployment. The underlying reason is that a fundamental structural change is underway.

Toffler believes America has only to look to Great Britain to see that the approaches of the old industrial era are not solutions to the problems at hand. He argues that industrial societies regardless of their politics will go through successive phases. Britain, because the industrial revolution started there, is prototypic. Theobald and Toffler believe society needs new policies based upon the reality of a post-industrial society. The communication era which has burst upon us, and which, despite all its massive innovations, has barely begun, is part of the relentless sweep to a service economy. They call for harnessing new technologies, increasing decentralization, participation decision-making, and a shift from competition to cooperation. They argue that social structures must adapt and therefore policies should aid the process.

Summary

We have presented four seemingly different views of the future. What do they contribute to our understanding of higher education planning? Is there anything they have in common? They have in common the conviction that the future is not beyond control. Kahn and the Hudson Institute say that the earth is far from bankrupt. Global 2000, Theobald, and Toffler tell us in different ways that there are very serious problems to address as the century closes. Their conclusions have obvious implications for policy-makers. Both Kahn and Ferguson tell us that humanity is engaged in a change process that has a life and dynamism of its own. A reasonable conclusion to draw from all four perspectives is that a simple extrapolation of present trends is not realistic, nor is it likely to match reality as it unfolds. Insufficient action, over-reaction, and a range of responses favorable and unfavorable are likely as societies struggle with their problems. There is a consensus that the world is moving through the industrial era to a post-industrial society, that basic and even secondary needs will be provided for by a decreasing proportion of the population. These changes will almost certainly bring radically different values and exchange systems to the world. Short-term surprises, even shocks, are likely, particularly when politics are pursued that are not in line with the next inner or evolutionary state of the process. Times of transition will be hard to forecast in detail.

Higher education will clearly face policy issues of its own. At what point will policy-makers embrace the future? There is a new danger here for education that it would be well for leaders to recognize early. The danger is that the new information age can and is offering alternative delivery systems for disseminating knowledge.

THE FUTURE OF HIGHER EDUCATION

We disagree with Victor Baldridge that the future does not have shape. It is not so uncertain that trends cannot be identified. It is necessary, we acknowledge, to cull the data and look for telltales in the wind to identify the trends. We agree that good people, able to make critical "jugular vein" decisions, will be necessary. To continue with his metaphor though, we think new techniques of examination will be necessary before inserting the knife. It is now possible to look inside veins, even so far as the heart itself, and higher education could profitably emulate the surgeons and seek out similar diagnostic tools. We believe there are eight important areas that require close scrutiny by higher education planners.

Demographics

The student pool for the traditional student of the entering class of 1998 is already with us. The entering class of 1993 has started in kindergarten. Finding out the size of the pool is therefore a counting job. There is uncertainty, of course, because high school graduation rates and the subsequent participation rate in college could and may well vary from present rates in the future. We have already seen, however, that in the Northeast there will be fewer young people to draw on year by year through to the middle of the next decade. It should be noted that other age cohorts are varying in differing ways. Institutional projections should be based on data from specific campus catchment areas because of local variations.

Demographic projections are fundamental building blocks for higher education planning. One must not blindly use any projections. Colleges are innovating in many ways to avoid decline, and extrapolation of past trends could therefore be very misleading. Improvements in retention, larger numbers of older and part-time students, and greater emphasis on life-long learning are a few of the new variables that must be factored into planning. Planners will need to keep a wary eye open for other trends as they develop.

The Service Economy

Kahn, et al (1976) have shown how the American economy has moved from originally a basic/secondary industry dominance, to presently a service dominance. They expect the service sector to reach 71 percent of employment and 60 percent of the GNP by 1985. Eli Ginzberg and George J. Vojta (1981) have also noted the steady change in the American economy. They suggest the service sector is now dominant having overtaken goods-producing elements of the economy. Other significant changes they noted are the growth of the nonprofit sector, increased emphasis on human capital, and the further internationalization of the economy. They summarize this impact.

> Perhaps more dramatically than the relative comparisons, the absolute employment and dollar figures, demonstrate the transformation of the structure of the economy over the three postwar decades. In 1948, 48.1 million people were employed, 29.9 million in goods production (15.5 million in manufacturing) and 27.2 million in services. The 1977 economy employed 79.5 million people, an increase of more than 30 million, 25.1 million in the goods sector (19.1 million in manufacturing) 54.4 million - more than the total payroll of the 1948 economy - in services (p. 43).

These then are broad pervasive trends in the economy and society itself. Recent studies in degree patterns over the past twenty years (Hester, 1981) lend support to the notion of an important connection between societal trends and program proportions. Certainly economic trends are not the sole dependent variables in considering changing patterns. There are likely to be relationships with broadening cultural patterns also.

The service economy which is presently developing is placing a premium on information handling. Many developments can be already detected (e.g., word processing) and others are not hard to conceive. The automated office, the talking computer, electronic mail, and integrated information systems are some of the more obvious developments that are likely to have a radical impact on life in this country over the next two decades.

Technology

Douglas Stevenson (1970), a world figure in the semiconductor business, took a speculative scan into the twenty-first century in a recent British journal article. He briefly reviewed the past fifty years, noting the mixture of the predictable and unpredictable that had occurred. He clearly shares our view about the future that trends are identifiable and predictable even though many surprises are also likely. He suggested an important distinction should be made between value growth and volume growth in considering the electronic industry. Overall value may grow at five percent per annum, in the decade ahead for the electrical industry, but volume, he thinks, will expand twenty to thirty percent a year. The reason for the relative drop in dollar volume is that computation prices are declining rapidly as technology improves. Electronics products will therefore play an increasing role in daily life. All parts of life will be impacted: the home, the office, the factory, the entertainment center and the school.

The energy crisis in 1973 has produced a search for alternatives to oil. Fusion energy, solar power, and other frontiers of physics will be increasingly explored for sources of power. Stevenson sees the possibility of an energy gap, lasting perhaps a decade early in the next century. Such a gap he thinks could cause tensions and dislocations that might even result in nuclear war. On the other hand, the energy needs of the world will tend to focus attention on research and conservation which may help to avoid such an energy shortfall.

The new technologies are generally capital intensive with significant needs for research and development. Because of increasingly rapid obsolescence, products must yield a satisfactory return on investment in shorter periods of time. These rapid changes point to the super-industrialism that both Kahn and Toffler speak of. New world trade structures will become increasingly urgent as industries and societies experience rapid change.

Another trend will be in search for bio-chemical solutions to problems. Bio-chemical research could provide new energy sources, controls for different types of pollution, or even synthetic food supplies.

Stevenson thinks another reach of science will be linking the mind directly to computers. He believes this will not be that distant an event since many precursors are already with us (e.g., bio-feed back systems). The missing element is the bio-component sub-systems. In a more exotic projection of these thoughts Glen F. Cartwright (1980) called the result of linking the mind to a computer the "symbionic mind."

We have only been able here to outline the barest sketch of technological frontiers. Within these frontiers many of the cycles or waves will be of only several years duration. As we have noted, capital must therefore be recovered in months rather than years as in the past. The most obvious implication of these trends for higher education is the need for improved information handling skills and the task of preparing people for a rapidly changing world.

Conservation of Resources

The energy crisis which developed in the last decade has focused awareness on the availability of different kinds of resources and the need to conserve them. A rapidly expanding world population will need shelter, energy, and food which will keep the demand and need for energy and other resources rising well into the next century. Global 2000 has clearly outlined the many resources which will be in great demand over the next two decades. Renewable energy and recycling to help offset the growth in demand, can therefore be expected to be growing social priorities in the future. For higher education this will mean that until alternative facilities and means are available for supplying energy, campuses will be likely to face rising energy bills or capital outlays to make present systems more efficient. There are also many possibilities for courses of study to prepare students for jobs in this important area.

The Older Student

One way of offsetting the impact of the demographic depression on enrollments is for higher education to cater more to the older student. A slight trend toward older students has been apparent in New York for several years. Along with this trend there has also been a growth in part-time study. These trends are not just a result of demographics, but also of the growing need for life-long learning in society. The once in a life-time concentration of education into a four-year time span does not meet the realities of life as well as it did twenty years ago. Whole new technologies, disciplines, and specialties can and do develop in very short periods of time, and if anything there seems to have been an acceleration of these new developments. A further sign of quickened pace is that textbooks in some fields can be out-of-date before they are widely in use. Industrial-based education (i.e., education by corporation) is in part a response to the need to continue the learning process throughout life. Here is a positive trend for higher education to consider giving higher priority.

Career Changes

One of the consequences of technological change and the rapid development of new products and ways of doing things can be seen in changing career patterns. People are finding it necessary to change careers and adjust their career tracks more often, for some individuals several times during their lives. We suggest the basic education a person receives could profitably be designed to prepare people better for a changing environment. There is greater need to encourage flexibility and provide more transferable skills.

World Population

World population generally will continue to expand rapidly and may not stabilize as quickly as has the population in industrialized nations. For the United States, this will mean in the future becoming a much smaller part of the overall population, with the possible consequence of reduced impact and status in the world. There will be a need for education to prepare people so that they are more inclined to recognize the new global realities which will emerge. Increasing the proportion of overseas students that come to the United States for their education may be a viable option in the lean years ahead for offsetting the demographic downturn that is expected. This may also foster good feelings among future leaders in other nations.

Internationalism

One of the consequences of the rise of capital demand in many industries, for example, electronics has been the necessity of securing larger markets in order to operate cost effectively. Companies have internationalized their operations. Japan, because of her almost total lack of basic resources, has had further incentives and has therefore given great attention to developing world markets. Robert Cole (1980) has suggested that Japan has given special emphasis to product quality and that this has been central to her success internationally. He argues that quality has been achieved through innovative, cooperative approaches to design, manufacture, and management. William Ouchi (1981) has identified individualism and intimacy as additional factors in the Japanese success.

Global 2000 suggested that the international focus should shift to north/south and that developing resources, expertise, and trade with our neighbors in the southern hemisphere promises better returns for future economic growth and world peace than an arms race. These are not only trends for higher education to recognize, but also opportunities for others to make significant contributions to research and education.

SUGGESTIONS FOR COLLEGES

Given the complex array of possibilities for the future and the overwhelming amounts of information, what can an individual college do? How can an institutional researcher make even a small dent in the problem?

The first step, of course, is to believe that the kinds of changes that futurists talk about are possible, and further that they will have an impact on one's own situation. Without this belief, there is no basis for the kinds of discussions, studies, and lobbying that will be necessary to adapt to and anticipate the changes that may come.

We believe major changes are inevitable over the next two decades, not only in demographics but also in other fundamental aspects of life. Some of them may be slowed by organized resistance, but changes will happen nevertheless. Some of them we already know about; some of them we can only speculate about.

Anyone concerned about preparing for a dynamic future should begin now to read about the future. Periodicals such as The Futurist, Change, Technology Review, and American Scientist provide many insights about changes on the horizon. There are also a growing number of individuals attempting to translate potential scientific breakthroughs into possible societal social and economic implications.

A second step one can take is to study the relationships between alternative views of the future and the programs and plans for your campus. Are they consistent? Are there major risks that you may be left behind?

Does your campus have enough innovators to be able to adapt to changes on short notice?

A third step is to push for greater agency and central office roles in understanding the future and its implications for higher education. Many insights are locked up in the data files maintained by higher education agencies, insights about higher education as a whole and its larger contexts as well as insights about how the individual parts of the system fit together. Many of these insights would be extremely valuable to campus planners and managers.

Perhaps the most important thing to do is to recognize the complexity of the problem and the uncertainties that exist. Designing effective programs and strategies for a college for 1990 is a problem that has many parallels with selecting individual stocks and overall portfolios in the stockmarket for 1990. One is never sure how long the indicators of the last six months will continue into the future. One must bring all the data, insights, and intuitions one has at hand to bear on the problem, and then be prepared to make adjustments when the contexts change. Above all, one must realize that one cannot do effective higher education planning by looking only at colleges and universities.

CONCLUSION

We have developed a general, global perspective for looking at the context of higher ecucation planning in the 80's and 90's. Our contention is that isolated extrapolation of a few variables is not likely to be very useful for planning and priority selection in the coming decades. We also believe that a distinction can and should be made between what is uncertain and trends that have some "critical mass." From these two priorities we conclude that top quality administrators are needed to not only handle uncertainty, but more importantly formulate sound policies based upon a broad view of reality.

The demographic depression poses a short-term threat to colleges and universities, but it could stimulate very useful environmental adaptations as educators turn to new markets. Innovators who calculate well and are willing to take risks will, we believe, be better for institutions than those who batten down the hatches. More flexibility and resourcefulness will be essential at all levels of administration in higher education There are many legitimate considerations which inhibit institutional programmatic response to change. New mechanisms or improved ones will be needed to allow and encourage institutions to respond to new technologies and changes. It may be necessary to develop new social strategies for societal adaptation.

We think modular courses should be carefully considered, perhaps built around a core curriculum. Individual needs and objectives, as well as specific job, related skills, and life skills, are fundamental factors in preparing for tomorrow's world. It is our view that education has served well the industrial society, particularly in America. It is probable that Toffler and Theobald are right about the coming era requiring more decentralization of systems and more autonomous, flexible individuals to work in them. Educational structures may also need to be less bureaucratic and more humane so that a different and more compatible social conditioning takes place for an environment that will be markedly different.

Strategic planning will need to lead through to the budget process. Incremental budgeting is not likely to be a central educational issue through this decade. Contextual definitions of quality related to specific missions will become increasingly important. Simple, comparative, single-criterion value judgements will become less satisfactory. The quality of an educational program will be increasingly dependent on the emphasis an institution gives to human development, counseling,career preparation, world perspective, and a general understanding of life.

We consider it essential for every college to formulate carefully a plan to optimize support for institutional change where it becomes necessary. A realistic recognition of obstables to change is important. Many institutional structures, both physical and organizational, are not conducive to change. Academic attitudes, sometimes rooted in perceptions of academic freedom, can also be barriers. More recently, threats to personal economic security posed by possible retrenchment has created a possibility of additional resistance. The literature of change should be carefully considered (see for example, Lindquist,1978) when formulating plans for the future.

The ten considerations outlined above will not be easy to follow in the present climate of restraint. A variety of solutions will likely be necessary and their pursuit will call for imagination, energy, and courage. Central to dealing wisely and effectively with a rapidly changing, complex world will be a broad perspective of both global and local contexts. We also believe a clear sense of the dominant themes of the future and the ability to develop plans for coping with the future are essential. We must move beyond extrapolation of simple data to strategies involving a wide variety of information and insights to synthesize a broader view of the whole environment, and the role of higher education in it.

REFERENCES

Abelson, Philip H. "Industrial Recruiting on Campus" Science, Vol. 213, No 4515, September 1981, p. 1.

Baldridge, J. Victor, "Higher Education's 'Jugular Vein Decisions'," AAHE Bulletin, Vol. 33 No. 10, June 1981, p. 1.

Carnegie Council on Policy Studies, Three Thousand Futures. San Francisco: Josey-Bass Inc., 1980.

Cartwright, Glenn F. "And Now for Something Completely Different: Symbionic Minds." Technology Review, October, 1980, 68-70.

Cole, Robert E. "The Japanese Lesson in Quality." Technology Review, July 1981, 29-40.

Crossland, Fred. E. "Preparing for the 1980's: Learning to Cope with the Downward Slope." Change, July/August, 1980, 19-25.

Ferguson, Marilyn. The Aquarian Conspiracy. Los Angeles: J.P. Tarcher, Inc., 1980.

Forrester, Jay W. World Dynamics. Cambridge, Mass.: Wright-Allen Press, Inc., 1971.

Francis, Carol. "Apocalyptic vs. Strategic Planning", Change, July/August, 1980, 19-44.

Ginzberg, Eli and Vojta, George J. "The Service Section of the U.S. Economy," Scientific American, March 1981, Vol, 244, No. 3, 48-55.

The Global 2000 Report. Hearing Before the Subcommittee on International Economics of the Joint Economic Committee Congress of the United States; Washington, D.C.: U.S. Government Printing Office, 1980, 67-833 O.

Hester, Donald G. Degree Patterns - An Indicator of Institutional and System Responsiveness. Princeton: NEAIR, 1981.

Johnson, Eldon L. "Misconceptions About the Early Land-Grant Colleges." Journal of Higher Education, vol. 52 No. 4, 1981, 333-351.

Kahn, Herman., Brown, William, and Martel, Leon. The Next 200 Years. New York: William Morrow and Company, Inc., 1976.

Kuhn, Thomas. The Structure of Scientific Revolutions. Chicago: University of Chicago, 1970.

Lindquist, Jack. *Strategies for Change*, Berkeley, Ca.: Pacific Soundings Press, 1978.

Mass, Nathanial J. and Senge, Peter M. "Reindustrialization: Aiming for the Right Targets," *Technology Review*, August/September, 1981, 56-65.

Ouchi, William. "Individualism and Intimacy in an Industrial Society," *Technology Review*, July 1981, 34-36.

Rowse, Glenwood. *The Simulation of College Enrollments*. Albany: The University of the State of New York, The State Education Department, 1980.

Rowse, Glenwood. *Trends and Issues in Higher Educational Finance.* Forthcoming.

Salk, Jonas Edward. *Survival of the Wisest*. New York: Harper and Row, 1973.

Silber, John. *The "Private" Contribution to Public Higher Education*. Boston: Boston University, 1975.

Stevenson, Douglas. "Into the Bio-electronic Age", *Electronic Engineering*, Vol. 51, No. 619, 138-147. March 1979.

Theobald, Robert. *Beyond Despair*. Washington, D.C.: The New Republic Book Company, Inc.,1976.

Toffler, Alvin. *The Third Wave*. New York: William Morrow and Company, Inc.,1980.

MICROCOMPUTERS: A REVOLUTION OF AWARENESS

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THE MICROCOMPUTER PHENOMENON

You and I are in the midst of a revolution in the delivery of computing resources to the end user. The nomenclature of this revolution is all too familiar: microcomputers, personal computers, distributed processing, professional workstations, intelligent (as opposed to "dumb") terminals, and more. Mass media of all forms - daily newspapers, weekly news magazines such as Time and Business Week, radio and television programs and commercials - have introduced technical jargon into the common vocabulary: 64K bytes, chips, floppy diskettes, hard disks, dot and impact printers, 8-bit and 16-bit processors, and the RESET key.

The following company and product names - unheard of just a short time ago - are now known to everyone: Apple, Visicalc, Z80, Pascal, CP/M, Atari, The Color Computer, The Source, and PacMan. New periodicals abound: Personal Computing, Byte, Kilobaud Microcomputing, and Dr. Dobb's Journal of Computer Calisthenics and Orthodontia. There are at last count five retail outlets for microcomputers within five miles of this room. We may be chronicling nothing more than the progress of technology; yet we are clearly in a revolution of awareness.

Those of us in higher education certainly have been exposed to computers for some time, first in research applications, then in administration, and finally in instruction. In your work particularly, computers have been used to store, retrieve, and analyze massive amounts of institutional data. Should we not, then, take these new developments in stride? Perhaps. Yet I have been actively involved with computers - in higher education - for a little less than twenty years, and I was simply amazed at the level of activity I discovered during my first visit to a microcomputer store one Saturday morning about two years ago. (I encourage those of you who haven't yet done so to visit a local microcomputer store soon.)

You might be interested in this quote from IBM's President:

> "We now ship a lot of things to customers that they unpack and install themselves. That's a far cry from a few years ago, when the computer arrived in a padded van with a bunch of fellows to carry it to the third floor."
> - John Opel
> Business Week, June 8, 1981

This comment appears only a few paragraphs later in the same article:

> "IBM, Fujitsu, and Hitachi are the only fully integrated computer makers in the world today."
> - industry consultant

A few months after these quotes were published, IBM shook the microcomputer industry with the introduction of its Personal Computer. Incidentally, this new IBM product's central processor was designed and manufactured by Intel, its disk drives by Tandon, its printer by Epson (a Japanese company), and almost all of its programs by companies other than IBM! One wonders what Fujitsu and Hitachi have up their sleeves.

This phenomenon, then, really is more than the advance of technology. We are seeing a profound change in corporate attitude by the largest computer manufacturer, a host of new manufacturers entrenched in the field, new approaches in aggressive marketing directed to individual users, and, most importantly, enormous interest on the part of everyone -- many with no previous exposure to computers -- in applying this technology at home and at work.

THE MARKET

It is useful to categorize the market for microcomputers by application: (1) use by family members in the home, (2) by professionals in the office, and (3) in small businesses. Through 1981, applications in the home had the largest share of the market by far. Home applications include entertainment, education, home management, remote control (of appliances), and communication.

Small business applications -- accounting, marketing, personnel managements, etc. -- are expected to comprise most of the market through 1985. Intensive marketing campaigns are now under way by a host of manufacturers attempting to capture shares of this market.

The remaining category is probably of most interest to those in institutional research: office use by professionals. Interesting applications include text processing, manipulation of small data bases, and modeling. Until quite recently, professionals have constituted a relatively small market for microcomputer manufacturers, though several manufacturers are now concentrating on the professional audience. The price structure of these systems is distinctly higher than those marketed to the home audience, as might be expected.

The size of each of these audiences is considerably greater than previous markets for computer technology, by orders of magnitude. This fact dramatically alters everything from marketing approach, avenues of appeal to potential buyers, the prices charged for goods and services, and the types of support vendors are either willing or able to provide. With audiences that number in the thousands, it is economically feasible for a developer to price an application software package in the hundreds of dollars. Contrast this with that data base application program running on your institution's mainframe: it was priced in the $20,000 - $100,000 range, because of the expected number of sales.

A great deal, however, is missing from the $100 package that is expected in the $50,000 sale. In a word, support. The company selling $50,000 packages usually bundles several days of training, and almost unlimited phone support, into the price. The developer of a microcomputer software package begins to lose money on your sale by answering the first phone call; therefore, no calls please. (By the way, this forces the developer of $100 packages to provide excellent instructions with his products.)

COMPUTER DEVELOPMENT AND EQUIPMENT DECISIONS

Since their inception thirty years ago, computers have increased in power, over a thousand-fold. On the other hand, the price of performing a given computation has decreased by about the same factor. What is remarkable is that the rates of increase in computer power and of decrease in relative cost have been almost constant since before 1955!

Moreover, there is every reason to expect that computers will continue to become more powerful - and cheaper - at about the same rates over the rest of the century, let alone the next few years! Therefore, computer purchase decisions should be made with the knowledge that tomorrow's equipment will perform better, and at less cost, than today's. A wise decision-maker always opts for a computer system that provides a smooth "growth path" to the next generation of equipment over one that does not. Today's computer will inevitably become obsolete.

Another dominant trend in the evolution of computer technology is the change in relative percentages of "hardware" and "software" costs. "Hardware" is the body of electrical and mechanical components that constitute the computer and peripheral equipment: the processors, memory elements, power supplies, storage devices (disks, magnetic tapes, etc.), terminals, printers, communications links, etc. "Software" is the set of instructions that direct the computer system's operations: the operating system (the "heart" of a computer system), and various programs oriented to given tasks, such as accounting, student registration, statistical analysis, text processing, etc. In 1955, hardware accounted for more than 80% of the total cost of the computer system (software made up the rest). Today, hardware amounts to around 10% of the total system's cost! Software development costs are inherently labor intensive, and cannot be expected to keep pace with plummeting hardware costs.

Current developments focus on "embedding" more functions in the hardware in an effort to reduce overall system costs. We used to "wait in line" to have our jobs executed one at a time by a single computer (the "batch" mode of operation). Today it is not only technically but economically possible for each of us to have our own "little" computer, able to perform most of those tasks.

Computing power is becoming "distributed" away from a large central processor to a microcomputer in the hands of the individual user. Little doubt remains that this trend will do anything but accelerate. The computer in our own hands will become increasingly powerful.

MICROCOMPUTER DEFINITION

What is a microcomputer, and how does it differ from those computers that were carried to the third floor? As we will discover, there is no simple answer to that question. If we attempt an answer based on technicalities (such as memory capacity, disk size, or printer speed), our answer will be made obsolete by the rapid technological development we have already discussed. It makes even less sense to define microcomputers in terms of the functions they perform, for the growing percentage of software-to-total-system costs is forcing developers to change the basic manner in which various functions are computerized. To this end, we are witnessing the development of "relational data bases", application-specific languages, and even complete computer systems designed for a given application or task, and other techniques that minimize the need for programming by the end user.

The one distinguishing characteristic of microcomputers is their intended use by a single user at a time, or "personal computers". Even though there is today much discussion of linking several microcomputers in networks (and that is already happening), the basic concept of a microcomputer is still that of a computer for the exclusive use of one individual. This concept contrasts sharply with the traditional implementation of a large - or not so large - single computer to which several terminals are connected, with each user at one of the terminals sharing the computer's power in order to perform several tasks in a shared manner.

The implementation of a single, shared computer suffers from three potentially serious drawbacks that the microcomputer strategy avoids: (1) the availability of the computing resource must be scheduled ("it's not available when I want to use it"), (2) the computer's responsiveness is inversely proportional to the number of users, for the system's capacity is always fixed at some level, and (3) the inevitable expansion of the system's capacity is expensive, and could require changes in both hardware and software vendors.

Today, the traditional approach has important advantages over the burgeoning microcomputer strategy. The central computing facility is generally much more reliable than a personal microcomputer, and has better data security procedures. In addition, the computing staffs of such central facilities have become expert in problem solving and training to an exent unavailable from the local microcomputer salesman. In short, the traditional approach is a better choice - today - for those applications needing high reliability or sophisticated programming. Yet even these applications will migrate to personal computers as microcomputers become more powerful and sophisticated.

MICROCOMPUTER CLASSIFICATIONS

A. WORD SIZE

It is useful to classify computers by size of their "word", the basic amount of information processed at one time. In general, the larger the computer's word size, the more powerful the computer. The first microcomputers had word sizes of 4 "bits", or "on/off" switches. Most of today's microcomputers, including the Apple and those made by Radio Shack, have a word size of 8 bits. Some very new microcomputers, such as the IBM Personal Computer, have a word size of 16 bits. We will see a microcomputer with a 32-bit word size in the not too distant future. (Incidentally, the largest of IBM's computers have a 32-bit word size.)

In addition, a computer with a large word size can utilize more memory for data storage than one with a smaller word size. This is precisely why the U.S. Postal Service is adding 4 digits to the ZIP Code. An 8-bit computer - one having an 8-bit word size - can hold 64,000 (actually, 65,536) characters in memory at one time; a 16-bit computer can hold over 1 million characters.

B. CENTRAL PROCESSOR

A computer's word size is determined by its central processor, the electrical component that actually executes each "software" instruction. Just as IBM has one with its new Personal Computer, almost all microcomputer manufacturers use one of very few processors, manufactured by another company. We have classified computers by word size; we can just as well classify them by which central processor they use.

Three central processors are used by almost every microcomputer today. They are: (1) Motorola's 6502, an 8-bit processor used by Apple, Atari, Commodore in its Pet, and Sinclair; (2) Zilog's Z80, an 8-bit processor used by Radio Shack, Zenith, Vector Graphic, Intertec, and several other manufacturers; and (3) Intel's 8086 (and the 8088, which is very similar), a 16-bit processor used by IBM in its Personal Computer, and by Altos in its new 16-bit microcomputer. The Z80 was developed much later than the 6502, while the 8086 series is later still.

C. OPERATING SYSTEM

Manufacturers of such processors not only decide on a word size, but also on the set of basic (not the high-level language BASIC) instructions -- the so-called "machine language" -- that the processor will understand.

An operating system for a computer is usually written with these basic instructions. One very important consequence of this is that a given operating system will work only on computers that use the central processor for which the operating system was designed. For example, the operating system CP/M, supplied by the firm Digital Research, was designed to work with the Z80 central processor. One finds that CP/M works on the Radio Shack, Zenith, Vector Graphic, Intertec, and several other microcomputers.

The converse is not true. The fact that several microcomputers use the 6502 central processor does not mean there is an operating system common among them. In fact, there is no common operating system available for the Apple, the Atari, the Pet, or the Sinclair, all of which use the 6502 processor.

Ultimately, the application programs -- the tasks -- you wish to perform must be compatible with the operating system of the computer you will use. And, as we have indicated, the developers of these programs must design them with a given operating system in mind. The lack of an operating system common to both the Apple and the Atari, even though they both use the 6502 central processor, means that an application program written with the Apple in mind must be totally rewritten for the Atari. Independent software developers will first develop their programs for the operating system or systems that in their opinion will reach the largest audience. The more common the operating system, the larger the library of application programs available for that system.

Among the numerous 8-bit microcomputers available today, the only operating system that could be considered a "standard" for more than one manufacturer is CP/M, designed for the Z80 processor. More than 250,000 software licenses have been granted by Digital Research for this operating system, and the number is rapidly growing. Of all the software available for 8-bit microcomputers, more of it runs under CP/M than any other operating system: it is the standard among operating systems for 8-bit microcomputers.

In order to compete successfully in this market, Apple has contracted with several independent software developers for programs that run on its computer. This tactic has been phenomenally successful: one of these programs is Visicalc, a very useful "automated spread sheet". Visicalc is easily the best known program available for any microcomputer. For a considerable period of time, Visicalc was available only on the Apple -- probably by agreement -- and is definitely responsible for the sale of thousands of Apples. The lesson here is that a potential microcomputer buyer will be more influenced by the set of well-written, useful programs available for the hardware being considered, than by the technical features of the hardware itself. (In fact, many Apples with the Visicalc program bundled in have been sold as "Visicalc computers".)

What about the upcoming world of larger 16-bit microcomputers, such as the IBM? Digital Research has announced an operating system called CP/M-86, that will run on the 8086 and 8088 16-bit processors, and execute programs written for 8-bit CP/M microcomputers! By choosing this processor, IBM has co-opted the large library of 8-bit CP/M software, and provided the expansion capability of a 16-bit computer.

Actually, another operating system is vying with CP/M-86 as the 16-bit "standard". It is UNIX, a system originally developed by Bell Laboratories for its internal use of much larger minicomputers (which were based on a 16-bit processor). Of course, as the only user of your personal computer, you are free to switch from one operating system to another, as required by the particular application program you wish to run.

APPLICATIONS TO INSTITUTIONAL RESEARCH

How do these developments affect your work in institutional research? A more meaningful question is how can you use these changes to your advantage today, and tomorrow. If you now use a computer terminal to access your institution's data, should you replace it with an Apple? An IBM Personal Computer? If you don't have such a terminal but are about to get one, should you acquire a microcomputer instead?

First of all, microcomputers are not yet a true consumer product. That is, if you purchase an Apple, almost all of your options - for hardware repair, additional software packages, expandability - are very much dictated by your original purchase. That's undesirable, but not deadly.

A second point is much more important: chose a system that either adheres to or will accept a common operating system. It is no accident that the best applications programs for professional use in the 8-bit microcomputer world run under CP/M.

Third, choose hardware that offers -- or will offer -- a straightforward expansion path, to larger disk and memory capacity, color monitors, and communications with other microcomputers and with your institution's other computers. By the way, this last feature -- talking with other computers on campus -- is probably pretty high in your priorities. Be cautious: transfer of information between disparate operating systems is often tricky. Here is a perfect task for your institution's programming staff to solve for you.

Fourth, microcomputers, as we now know them, will soon look a lot different, with many new features, delivered in entirely new ways. For example, some people believe the real explosion in computing delivered to the individual will come in 1985, when the home television set will include computing, access to national data bases, the ability to perform electronic fund transfers and order entry - all for $500. The pace of development is mind-boggling.

Finally, you can decide to wait out these developments, and purchase a more powerful microcomputer for less money. The very real cost of this approach is the tremendous improvement in effectiveness lost during the wait. Any choice you make will become obsolete, but that will always be true. The attractive choice is one that will become obsolete in three years, not in three months.

A COMPUTER MODEL FOR LONG RANGE ENROLLMENT PLANNING

David W. Bradley, Peter T. Farago, and Carolyn F. Shettle
Boston University

INTRODUCTION

In spite of all the uncertainty about how demographic and economic trends will affect college enrollment, one set of assumptions can be regarded as fairly reliable.

- A college or university in the Northeast must be especially cognizant of student market trends due to amplified projected population declines.
- Institutional planners have two fundamental types of enrollment variables to address: entering student trends and continuing student retention rates.
- Decisions regarding entering class (admissions) objectives must be supported by an understanding of the main and interactive effects of market share, market distribution, and admission standards.
- An institution with a regional or national drawing power which maintains the status quo with regard to these decision variables will experience a substantial enrollment decline.
- The combined effect of entering class policy and achievable improvements in retention rates should be considered in the allocation of enrollment management resources and responsibilities.

These assumptions serve as the basis for Boston University's approach to enrollment management.

A computer simulation model was developed in response to the central administration's concern about the effects of demographics on Boston University's future undergraduate enrollment. The nature of any computer model is to ignore those factors that are not readily quantifiable (either in terms of data availability or in terms of the effects they actually have). A useful model must at least be designed in a fashion that sufficiently approximates the mathematical relationships among the known quantifiable inputs. The variables which we chose to include in our quantitative model were the number of high school graduates by state, Boston University's market shares by college in each state and student retention rates by college. Other important variables such as student quality, pricing and levels of financial assistance, just to mention a few, are not included in the model at this time.

A brief description of Boston University's current (September, 1980) market position and tentative planning guide will enhance the reader's understanding of the design and capabilities of the model. The marketing definitions and parameters utilized herein have been developed for both illustrative and actual planning applications.

Boston University each year enrolls over 3,000 new freshmen, 1,000 new transfers, and over 9,000 returning undergraduates. These students represent all 50 states and over 80 foreign countries and U.S. territories. Each student enrolls in one of 10 undergraduate Schools or Colleges, and chooses one of 140 major fields of study. During each recruiting cycle, the Office of Admissions contacts over 200,000 high school students by means of direct mail, and affords personal contact to over 50,000 potential students through a recruitment staff of 14 full-time admissions officers and an alumni volunteer network with area chairpersons in 33 cities. Intensive recruitment efforts are focused on 17 key states, with visitation to 14 other states and 15 foreign countries. After students enter the University, their retention rates vary among the different colleges and programs. These different retention rates translate into final graduation rates ranging from 30% to 75%, depending on the program of study.

The University acknowledges the distinct possibility that undergraduate enrollment will decline unless significant steps are taken. Nevertheless, the articulated objectives of the administration are to maintain a stable enrollment and to either maintain or increase the academic quality of entering students. Planning efforts have begun to outline the alternative approaches we might take in meeting these objectives.

METHOD

It is apparent that enrollment management decisions as they relate to both external and internal student markets must rely on the manipulation of vast amounts of data and must account for not only surface trends and effects but also the resulting interactions of the smaller reactive elements. The complexity of long range enrollment projection in an environment involving vastly different market shares and market trends in different geographic regions, coupled with variations in market shares and retention rates among ten undergraduate colleges, points to the need for a computerized model. This need is further supported by administrators' needs for a way to test hypotheses concerning enrollment variables and to get fast on-line display of the results of alternative scenarios.

For Boston University it was felt that flexible parameters must be developed for the geographical manipulation of data on the national level. As a result, external student markets have been broken into five key geographical segments for macro-level planning purposes.

1. Primary Market: containing six states.
2. Established Secondary Market: containing seven states.
3. Developing Secondary Market: containing fourteen states.
4. Tertiary Market: containing twenty-four states.
5. Foreign Markets

The reason for considering this type of geographic segmentation of our market lies not only in our market shares, which are different in each of those regions, but also in the differences in the population trends among these same regions. State boundaries are used to enable the use of existing data on projected high school graduates.

Table 1 shows the pronounced effect of population declines on the primary student markets and the potential utility of redistributing promotion and recruitment efforts to account for the different geographical trends.

TABLE 1
BOSTON UNIVERSITY STUDENT MARKETS
NUMBER OF PROJECTED HIGH SCHOOL GRADUATES AND PERCENT CHANGE FROM 1980

	1980	1985		1990		1995	
MARKET AREA	N	N	%	N	%	N	%
Primary	569,389	476,473	-16.3%	384,172	-32.5%	356,088	-37.5%
Established Secondary	712,577	598,622	-16.0%	561,266	-21.2%	578,731	-18.8%
Developing Secondary	714,768	616,110	-14.1%	601,681	-15.8%	624,226	-12.7%
Tertiary	793,402	676,429	-14.7%	674,681	-15.0%	720,156	- 9.2%
TOTAL U.S.	2,790,136	2,365,634	-15.2%	2,221,800	-20.4%	2,279,201	-18.3%

SOURCE: WICHE

DESCRIPTION OF THE MODEL

The need for a model having been established, the characteristics of the model were specified by asking three questions. Who will use the model? What will it be used for? What data are available to formulate the model?

The users of the model were to be planners both at the central administrative and college level. This implied that the model had to treat the various schools and colleges either separately or together in the aggregate, depending on the user's specifications. It also required that the model be interactive, allowing for on-line user input.

The model must enable the user to evaluate the enrollment implications of various predictable and manageable variables; specifically geographic market share(s) and alternative retention patterns. The sources of data available included ten years of historic data pertaining to geographic origin, college of enrollment and longitudinal retention patterns of our undergraduate students. The foundation of the projection methodology is the forecast of high school graduates by state published by the Western Interstate Commission on Higher Education.[1]

The concept about which these factors were combined is a rather simple concept of student flow (see Exhibit 1). The projections of high school graduates are combined with regional market share data (either real or hypothetical goals) to yield an estimate of entering class size. As each cohort enters the model, longitudinal retention rates (again either real or hypothetical goals) are used to estimate what portion of that cohort will be enrolled at a later time. By combining data for all geographic regions and all colleges for successive cohorts, the total undergraduate enrollment is estimated. The advantage of the model is in enabling the user to try out different hypotheses and ask different questions about the interaction of the enrollment variables.

The model is designed to allow the user to ask four types of questions. Each of these represents one option which the interactive feature of the model supports. Exhibit 2 is a graphical representation of the user's alternatives in executing the model.

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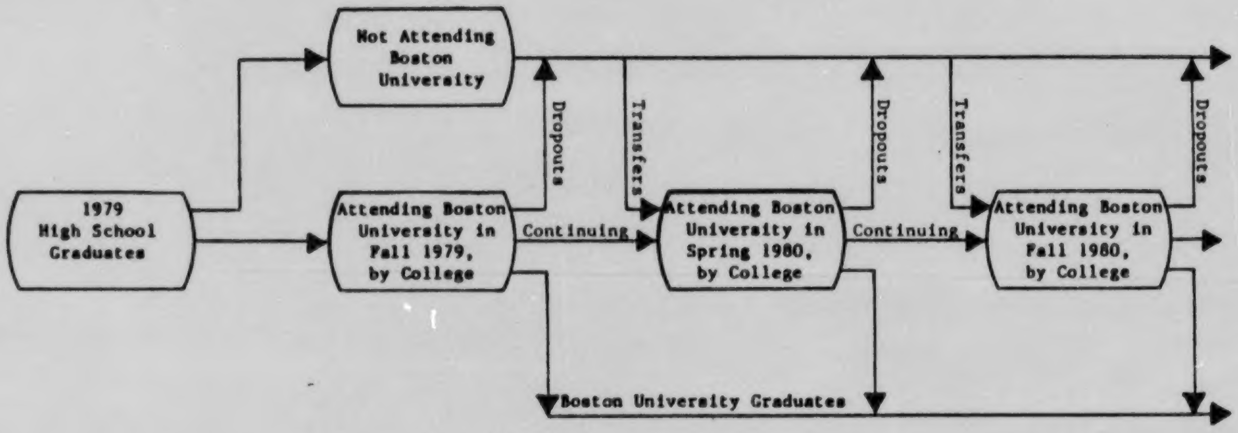
[1] High School Graduates: Projections for the Fifty States, Western Interstate Commission for Higher Education, November 1979.

EXHIBIT 1: STUDENT FLOW CONCEPT


Not Attending Boston University
1979 High School Graduates
Attending Boston University in Fall 1979, by College
Dropouts
Transfers
Continuing
Attending Boston University in Spring 1980, by College
Dropouts
Transfers
Continuing
Attending Boston University in Fall 1980, by College
Dropouts
Boston University Graduates

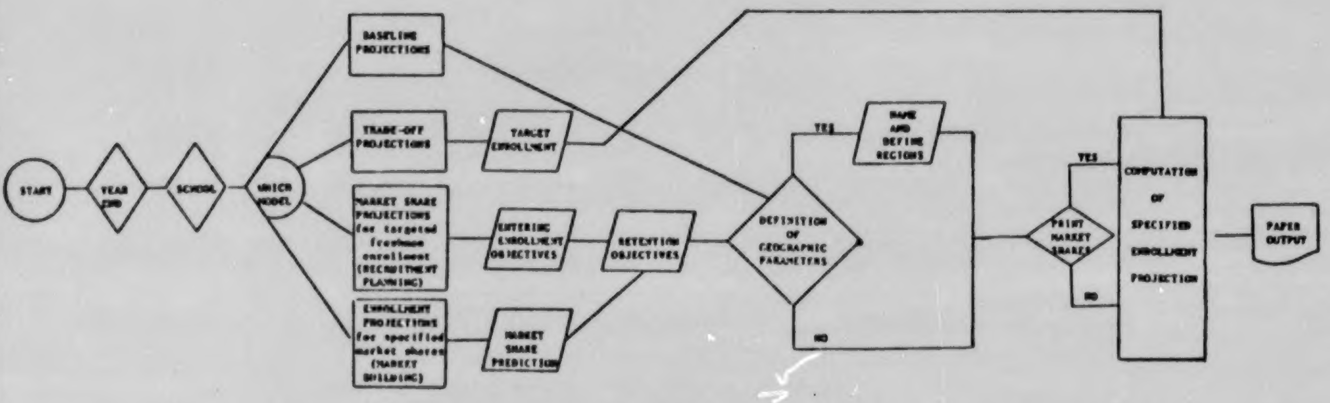

START
YEAR END
SCHOOL
WHICH MODEL
BASELINE PROJECTIONS
TRADE-OFF PROJECTIONS
TARGET ENROLLMENT
MARKET SHARE PROJECTIONS for targeted freshman enrollment (RECRUITMENT PLANNING)
ENTERING ENROLLMENT OBJECTIVES
RETENTION OBJECTIVES
ENROLLMENT PROJECTIONS for specified market shares (MARKET BUILDING)
MARKET SHARE PREDICTION
DEFINITION OF GEOGRAPHIC PARAMETERS
YES
NAME AND DEFINE REGIONS
NO
PRINT MARKET SHARES
YES
NO
COMPUTATION OF SPECIFIED ENROLLMENT PROJECTION
PAPER OUTPUT

EXHIBIT 2: THE MODEL FROM A USER'S PERSPECTIVE

Baseline Projection:

What will happen to our enrollment if we maintain our current regional market shares and our current retention rates? This option produces a report of annual expected entering class size and total enrollment resulting from only demographic changes. In combination with graphic output, this report is quite effective in driving home the reality and magnitude of the demographic constraints.

Trade-off Analysis:

What combinations of freshman decline and retention rate improvement will yield a target enrollment level in a specified future year? This mode allows the user to evaluate what total enrollment levels can realistically be expected in future years by combining feasible goals for freshman class size and for retention rates. A graphic display again helps to drive the point home.

Recruitment Planning:

Given our assumptions about changing retention rates, what must the regional market shares be in each of the coming years in order to achieve our target enrollments? This mode allows the user to specify the target enrollment level in a future year along with assumed retention rate changes (after settling on a possible target based on the Trade-off Analysis) and to determine what market shares must be achieved in various states or regions to yield the targeted future enrollment level.

Market Building:

What entering class size and total enrollment level will result in each future year from making specified improvements in retention rates and/or in the various state or regional market shares? This mode allows the user to set market share and retention goals (instead of enrollment targets) and shows the enrollment levels which will result from these combined goals.

It should again be pointed out that each of the four options can be run for any one or the combination of all ten undergraduate colleges at the University and that the model can treat each state as a separate market region or combine them as specified by the user into fewer, more global market regions. A sample of each of the four options, including the user-model interaction (i.e., query and response sequence) and the resulting output, both tabular and graphic, is available on request from the authors.

APPLICATIONS TO PREDICTING FRESHMAN ENROLLMENT

An example of how simulation results might be interpreted and utilized in planning for entering freshman recruitment may help to demonstrate the model's potential. Table 2 shows the results from a baseline (market trend) run. In terms of marketing planning, this option may be interpreted as the status quo.

TABLE 2
BASELINE PROJECTION OF ENTERING FRESHMEN

	MARKET SHARE[2]	1980		1985		1990		1995	
		N	%	N	%	N	%	N	%
Primary	47.43	2,616	75.1	2,188	74.4	1,755	70.8	1,623	68.6
Established Secondary	5.01	397	11.4	333	11.3	312	12.6	320	13.5
Developing Secondary	3.04	261	7.5	226	7.7	218	8.8	225	9.5
Teritary	1.06	98	2.8	82	2.8	82	3.3	86	3.6
Foreign	N/A	112	3.2	112	3.8	112	4.5	112	4.7
TOTAL	12.09	3,484	100.0	2,941	100.0	2,479	100.0	2,366	100.0

---

[2] Market Share is presented as the number of matriculants per 10,000 high school graduates.

It is interesting to note the geographical redistribution of the freshman class which would result from the perpetuation of a constant market share. Maintaining a constant share of market in each of the major market segments would effectively reduce our share of the U.S. market from 12.09 to 10.38 matriculants per 10,000 high school graduates over the 15 year period. This translates to a 32% decline in entering class size compared to an 18% national decline in high school graduates.

On a more optimistic note, the results of a market building simulation demonstrate the potential to hold entering freshman decline to a more acceptable level by means of planned geographical market development. (See Table 3.)

TABLE 3
MARKET BUILDING PROJECTION OF ENTERING FRESHMEN

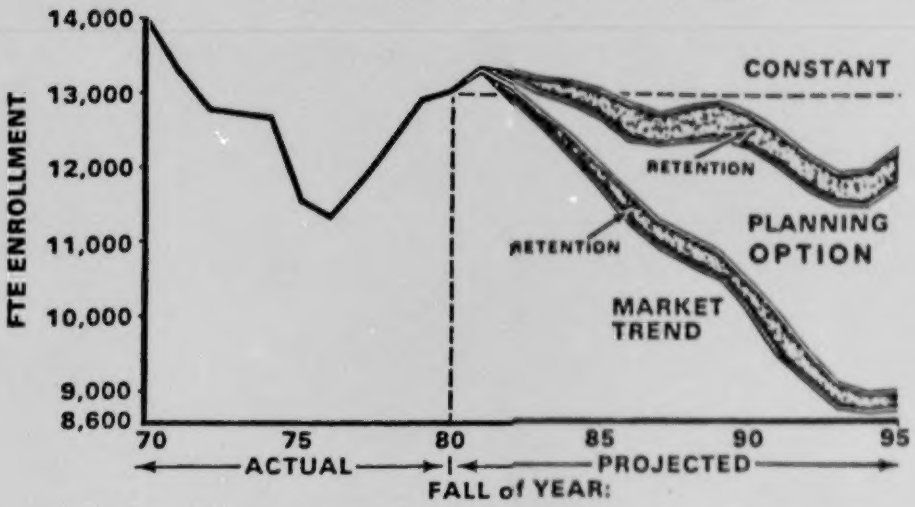
MARKET	1980			1995			ADDITIONAL MARKET
REGION	N	%	MKT SHR	N	%	MKT SHR	SHARE PER YEAR
Primary	2,616	75.1	47.43	2,195	67.4	61.65	0.94 share points
Established Secondary	397	11.4	5.01	493	15.1	8.51	0.23 share points
Developing Secondary	261	7.5	3.04	349	10.7	5.16	0.14 share points
Tertiary	98	2.8	1.06	106	3.3	1.59	0.03 share points
Foreign	112	3.2		112	3.4		
TOTAL	3,484	100.0	12.09	3.255	100.0	13.79	0.11 share points

By assuming a yearly increase in market share of 2% (0.94 share points) in the primary market, 4.6% (0.23 share points) in the established secondary market 4.6% (0.14 share points) in the developing secondary market and 2.8% (0.03 share points) in the tertiary market, the decline in freshman enrollment could be checked at less than 7% at the end of the 15 year period. These objectives, successfully achieved, and accompanied by a 20% improvement in the overall retention rate would yield a more stable enrollment

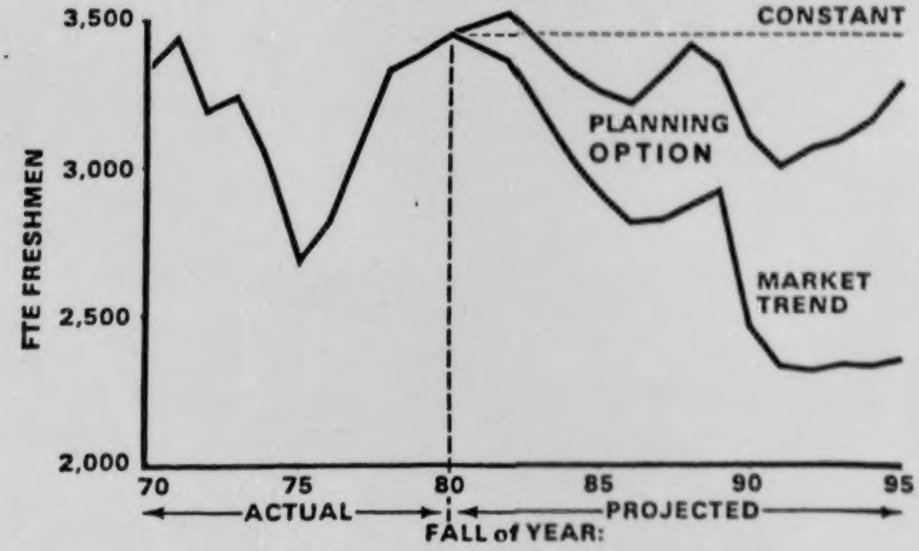
EXHIBIT 3

November 1980

UNDERGRADUATE FTE ENROLLMENT
with IMPACT of a 15% REDUCTION in ATTRITION



FRESHMEN ENROLLMENT 1970 - 1995



pattern, all other factors being equal. Exhibit 3 illustrates the types of enrollment forecasts possible using combinations of hypothetical market share and retention goals.

Although these targets figures may sound unrealistically high, the September, 1981 enrollment figures will show that each of those objectives for the entering freshman class have either been met or substantially surpassed.

Perhaps the most important interaction effect to consider when predicting freshman enrollment is the interaction of curricular drawing power (market share by college) and geography. It is evident that certain colleges (such as Liberal Arts and Nursing) will not have equal potential to attract students from outside the primary market region. If a projection were done based on the total University's market share it would not account for this interaction. The model has been designed so that any projection of the total enrollment is computed as the sum of the individual college, rather than as a function of total market share.

It is also interesting to note how the arbitrary definition of market regions will affect the enrollment projections. By clustering states together a user will cover up the different population trends within the region. For example, while the market trend projection using the five major market regions yielded a 1995 entering freshmen projection of 2,366, an identical projection done for the fifty-one states will yield a 1995 entering freshmen projection of 2,298.

CLOSING COMMENTS

It should be noted that the model as described has numerous applications but also has some limitations. Conceptually, it omits treatment of admission criteria, economic and academic trends, and changes in competitive environment, all of which are important factors affecting future enrollments. However, since these factors are always present, they do not detract from the model's usefulness in providing a base upon which these effects can be superimposed. Second, the model treats only undergraduate enrollment of the traditional age group of high school graduates. It ignores enrollment of older undergraduates and of graduate and non-degree students who represent an ever increasing portion of the University's total enrollment. Third, in some of our colleges, there is a need to disaggregate the data further to the level of departments in order to reflect different trends among disciplines. Fourth, as any model, this one is highly dependent on the reliability of its input variables, specifically the accuracy of high school graduate projections. For example, the lack of accurate data for independent secondary schools would severely limit the applicability of this model to institutions for which this is their dominant market. Addressing these problem areas within the context of our model represents the next possible phase of our development efforts.

In spite of the limitations, we can report that the model has been and is being used at Boston University as one more tool in allowing administrators to address the pressing problems of enrollment planning. As a final comment we would like to point out that the model is conceptually simple and uses data generally available in many institutions. In smaller colleges the market segmentation may use a base different from state-wide projections of high school graduates and may only have to deal with total college-wide enrollments rather than the ten colleges of Boston University. With these changes, however, we feel that a model such as this one may be useful to many institutions in managing future enrollment.

ENROLLMENT PROJECTIONS FOR A REGIONAL INSTITUTION

Winship C. Fuller
Susan A. Goodwin

University of Lowell

INTRODUCTION

The Office of Information Systems, in charge of institutional research at the University of Lowell (Lowell, Massachusetts), has developed a procedure for predicting undergraduate enrollments on an institution wide basis. This procedure may be adaptable to other state or private institutions which draw their enrollments primarily from clearly identifiable geographic areas. The method first isolates those cities and towns which historically have accounted for the bulk of enrollments. Second, information is gathered from the State Department of Education on current student enrollments at each grade level in these public schools. Third, a computer model projects how many of these students will be promoted from grade to grade each year, how many will then graduate from high school, and finally the proportion that will elect to attend this particular university. Thus, based on the actual number of children already in grade school and high school in this service area, the method allows year by year projections of the University's share of the college age population through 1996.

Additional analysis can also be undertaken in Massachusetts in that the State Department of Education annually gathers frequencies and percentages of each town's college bound students who have elected private verses public colleges (each broken down into two-year and four-year institutions). It is anticipated that tracking deviations from the historical patterns in this mix would serve as a proxy for the impact of changes in federal financial aid and changes in the relative public/private tuition gap, both factors for public university enrollments.

National Context - The Problem in a Nutshell

The Carnegie Commission Report, Three Thousand Futures: The Next Twenty Years of Higher Education [1], comments on the decline in enrollments expected nationally, clearly identifying that the traditional college bound cohort of 18 to 24 year-olds will shrink by 23% from 1980 to 1997. It is also clear, however, that this decline will not occur at an even pace over those years or spread itself evenly over geographic regions of the United States. From 1983 to 1988 enrollments are expected to fall at an annual rate of 1.9%, then slow temporarily in 1989 and 1990, and fall again at 2.3% annually from 1991 to 1997. Geographically, the Northeastern quadrant of the United States is expected to be hardest hit. Given this national picture, the Academic Vice-President at the University of Lowell, a public comprehensive University of 15,000 students located in Northern Massachusetts, became concerned and formed an Enrollment and Retention Task Force to articulate an enrollment projection model which would place the University of Lowell in both a national and regional context and to provide a program of action for the 1980's. As part of this process, the authors developed and estimated the enrollment projection model described below.

The Enrollment Model

Preliminary examination of all freshmen and transfer enrollments by zip codes for each of the five years since the University data base was computerized quickly identified that 100 towns provided three-quarters of the freshmen enrollments, with the rest of the freshmen being drawn in very small numbers from all other towns in the Commonwealth of

Massachusetts and from outside the State. These towns were then identified as those whose enrollments in grades kindergarden through twelve would be key to the University's future undergraduate enrollment. Data were then obtained from the State Department of Education on the public school enrollments (K through 12) in these 100 feeder cities and towns. Since parochial and private school enrollment represented less than 5% of the total and are not typically a source of University of Lowell students, they were not included in the analysis.

The data from the State Department of Education contained several types of information: (1) the head count enrollments in each grade, K through 12 grade, (2) the number of twelfth graders who actually graduated each year, and (3) the number of those graduating who elected to go on to college the following September, broken down by two-year and four-year, public and private institutions. Such data aretypically gathered during October of each year. This raw data for each of the "feeder towns" were analyzed in the following way to obtain the enrollment projection for the University:

(1) The most recent years of K-12 data were examined to derive the proportion entering each grade who were then promoted to the next grade; in this manner it is possible to predict enrollments for the next higher grade. This estimated success rate for promotion from grade to grade is applied in sequence to the cohort of students entering each grade and proceeding through to graduation from high school and continuing on to college.*

(2) The University's share of the students graduating from the twelfth grade and electing to go on to college was calculated and an arithmetic average of this share for the past three years obtained.

Thus, in its simplest form, the enrollment model for the University of Lowell examines the number of students now enrolled in the one hundred feeder school systems, follows each grade cohort through to graduation, determines the number who are likely to attend college, and the probable number who will enroll at the University.

The methodology therefore produces the predicted number of first time freshmen who can be expected each year through 1992, the year by which first graders enrolled as of Fall 1979 would be eligible for college enrollment. Thus, the year by year pattern of expected enrollments over a twelve year period can be used for planning purposes; critical turning points can be adjusted for in an even fashion and counter measures can be planned and undertaken with enough lead time so that their impact will be meaningful.

The second part of this model, analysis of the percentage distribution between public and private and between two-year and four-year institutions has been examined for three years. No significant differences in proportions have been identified as yet; however, due to recent changes in state and local funding of education in Massachusetts, the pattern of such enrollments will be examined quite closely over the next several years. It is also expected that the shift in Federal Financial Aid Policy and the widening relative tuition gap between public and private institutions will influence such patterns. The implications for our institution have involved both policy changes and increased faculty involvement in admissions and retention issues.

Implications

Policy changes have included a newly implemented January admissions program for freshmen. A side effect, however, was that this required a rearrangement of course offerings to accommodate those students in courses in a two course sequence which previously had been scheduled only in small numbers in the Spring for those students who dropped out or flunked out in the Fall. Now larger numbers of freshmen entering in January require not only those Fall courses in their disciplines, but support courses in English, Mathematics, Science, and Social Science. More elaborate course and faculty workload planning has therefore been required.

The second major impact of this analysis was a change in thinking about students; no longer is the focus simply on getting students to come to the University, but a strong effort is now being made to keep them here once they have enrolled. Thus, the enrollment model is being buttressed by a retention model which traces students through their four or more university years to graduation. (The national and University of Lowell average is that only four out of ten entering freshmen will graduate with a bachelor's degree four years later). Concern was therefore focused on what we could do to prevent dropouts and encourage stopouts to return. The Vice-President for Academic Affairs thus formed a Retention/Enrollment Committee to deal with these issues. Policy and procedural changes are expected to result which focus on keeping students in school longer before forcing them to drop out to increase counseling and support services to students during the critical Fall of their freshmen year, and to reinforce the idea that faculty must become increasingly concerned about the student's progress.

The paradox which has emerged at the University of Lowell is particularly complex. As a new University (two institutions with histories from the 1890's were merged), it is experiencing a startling growth in enrollment, partly due to the professional programs offered (Computer Science and Engineering programs are directly linked to good job prospects with the Massachusetts High Technology industry) and partly due to its enhanced image (changing the name to a university has increased markedly over the past five years). Yet, nationally and regionally, this year is the peak of the enrollment boom. In some parts of the Northeast the peak has already been reached, with enrollments already leveling off and the decline, ever so insidiously, starting to be felt.

It is critical that institutions plan in moments of calm, not in the throes of crisis. Typically, retrenchment and programmatic re-adjustment at colleges require both faculty consultation and professional imput and often must account for collective bargaining constraints. There is also a moral and legal obligation to allow students reasonable opportunity to complete their curriculum once they have been admitted. This puts a four to six year time frame on discontinuance of service in most program areas. Thus, change in academic setting is often slow and labored. The lead time identified by the model thus is able to help the Academic Vice-President initiate programmatic re-direction now rather than simply sitting back to await the problems that the end of a decade are likely to bring.

Conclusions

The Office of Information Systems views the enrollment model as a tool to catalyze hard to move interest groups and to speed up the deliberative processes that are part of the collegial processes. Each year the projections will be updated with an eye toward reinforcing the need for action now to counterbalance impacts which will only be plainly felt at least half a decade from now. Because of the use to which this model is currently being put, no need is seen for further refinement.

[1] Carnegie Council on Policy Studies in Higher Education, Three Thousand Futures, Jossey Bass, Publishers San Francisco, 1980.

* We are grateful to Richard Ballou, formerly of the Massachusetts Board of Higher Education, for sharing a similar methodology with us.

Enrollment Projections: A Model for the Regional Public Institution with a Non-Traditional Student Population

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Introduction

During the 1970s, reports by educational planners postulated that the declining birth rates of the 1960s would result in a sharply reduced traditional college-age pool in the 1980s (Carnegie Foundation, 1975; Dresch, 1975; McPherson, 1976; Shulman, 1977). Without appropriate contingency planning processes and/or documents, this reduced pool would inevitably place a strain on the financial vitality of many institutions. Forced to confront this predicament, institutions would find themselves in an unenviable position where facilities would deteriorate, academic programs and faculty could be cut and accreditation could be revoked. Eventually, if this scenario was not reversed, institutions would be forced to either merge (thus losing autonomy) or cease operations.

To date, because of their funding sources, public institutions have faired far better than their private counterparts, where the most dire combinations of the aforementioned predictions have come to fruition. However, with tax reform sentiment sweeping the nation and recent cuts in federal and state budgets, it appears there will be less funds available for public higher education. As one means of determining where limited public higher education resources should be allocated, state coordinating agencies and governing boards have turned to enrollment projections. While sound in their fundamental methodologies, these models have tended to be designed for the institution which has traditionally drawn the majority of its student population from the 18 year old, white socio-economic "middle class" pool. Yet, in the last twenty years there has been a dramatic change in the racial ethnic, sex and age composition of the student population in American higher education. Today more minorities have and are entering colleges and universities. Concurrently, more women have returned or are planning to return to the work force. These groups are combining with an older adult population to increase the pool of those seeking to continue or complete their post secondary education. Thus, this egalitarian movement has challenged the validity of earlier projections and suggests that the traditional projection models cannot and should not be applied to institutions with a non-traditional undergraduate student population. Such institutions have an undergraduate body composed of students with at least a 20% minority background, more women than men, a large percentage of students beyond the age of 22 and more part-time than full-time students.

Therefore, the purpose of this paper is to propose a refinement of a traditional projection model adopted by the New Jersey State Department of Higher Education in 1978. The State Planning System (Bassett et al., 1977) enrollment projection software package was originally developed by the National Center for Higher Education Management Systems. This model was refined and included for implementation as part of a New Jersey statewide mandated higher education planning process.

Procedures

Data Generation and Acquisition

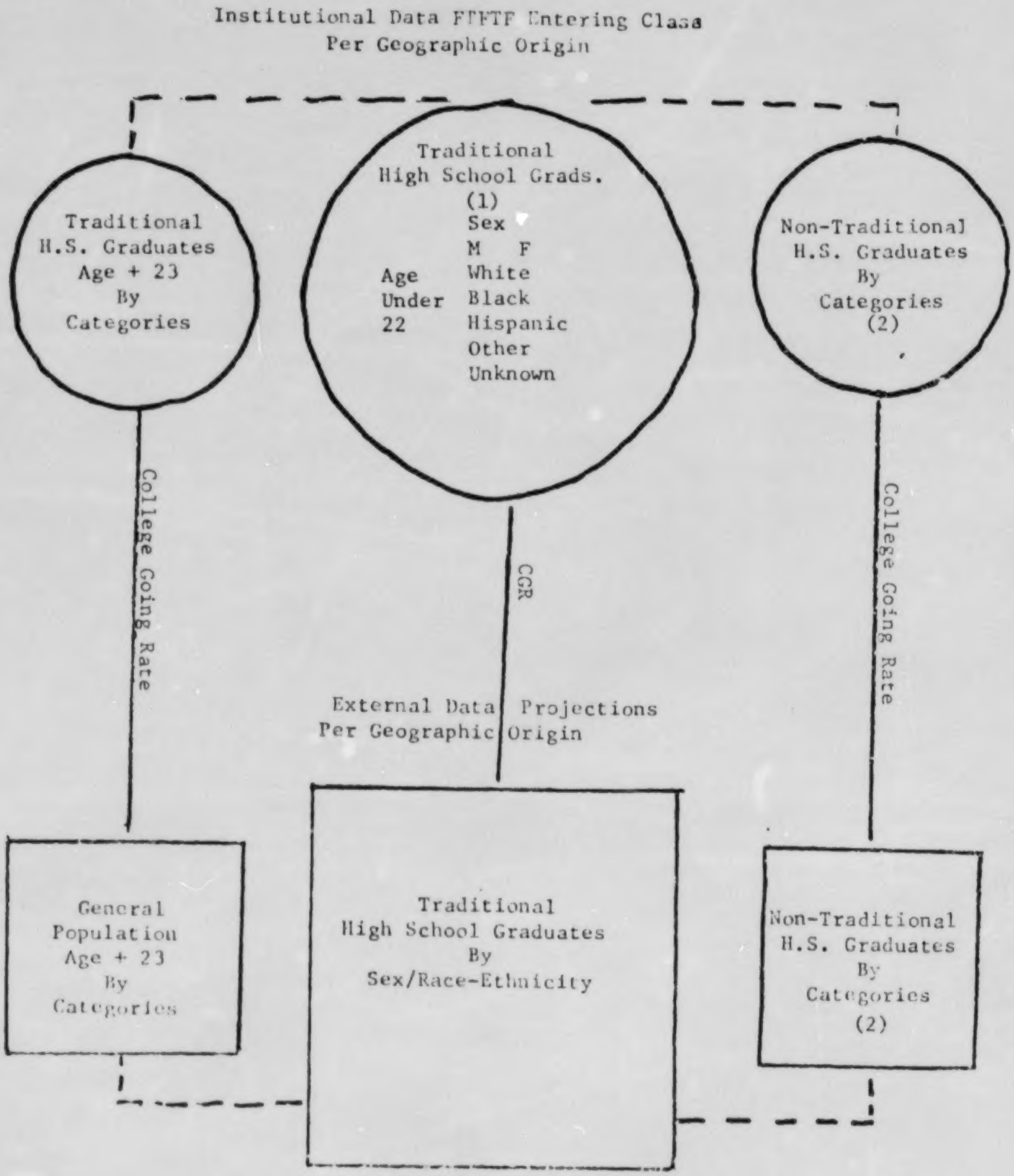
Before implementing the proposed model, several key elements of institutional and geographic projection data (e.g. county location) must be generated and acquired. The institutional data (prepared on a Fall semester basis for at least the three previous years) should include: a racial ethnic breakdown of First-Time Full-Time Freshmen (FTFTF) by age, sex, geographic origin and type of high school degree (traditional or non-traditional); a racial ethnic breakdown of matriculating and non-matriculating part-time students by age, sex and geographic origin; a racial ethnic class breakdown of transfer students by age, sex and geographic origin; and a racial ethnic breakdown of class retention rates by age, sex and geographic origin. This data may be generated from either an integrated longitudinal student data bank; or by extracting and then merging admission and registrar files; or (although not advisable) by extrapolation using appropriate HEGIS documents. The regional projection data (acquired on a five or ten year basis) should include a racial ethnic sex breakdown of traditional and non-traditional high school graduates.(This should also include the traditional and non-traditional high school graduates for the three years previous to the model implementation); and a racial ethnic breakdown of the general population by age and sex. Although such data should be available from state or county departments of education, local school boards, the 1980 Census, and state/county planning agencies, appropriate extrapolations may have to be performed.

Calculations

Full-Time Undergraduate Student Projections

Full-time undergraduate projections for the specified time frame are calculated by a cohort survival methodology. Figure 1 depicts the internal and external data integration necessary for FTFTF instate calculations. It begins by assuming an internal three year average has been respectfully calculated for the traditional high school graduates under 22, the traditional high school graduates over 23, and the non-traditional high school graduates by the designated categories per geographic origin. This average is then divided by a similar external three year average that coincides with each high school graduate segment in order to determine a college-going-rate (or historical index) for that region. The college-going-rate is then multiplied by the external data

Figure 1. Flow Diagram First-Time Full-Time Freshman Calculations


Institutional Data FTFTF Entering Class
Per Geographic Origin
Traditional
H.S. Graduates
Age + 23
By
Categories
Traditional
High School Grads.
(1)
Sex
M F
Age
Under
22
White
Black
Hispanic
Other
Unknown
Non-Traditional
H.S. Graduates
By
Categories
(2)
College Going Rate
CGR
College Going Rate
External Data Projections
Per Geographic Origin
General
Population
Age + 23
By
Categories
Traditional
High School Graduates
By
Sex/Race-Ethnicity
Non-Traditional
H.S. Graduates
By
Categories
(2)

(1) Public, private, parochial schools. (2) GED or equivalent. Categories, unless specified are age, sex racial ethnic.

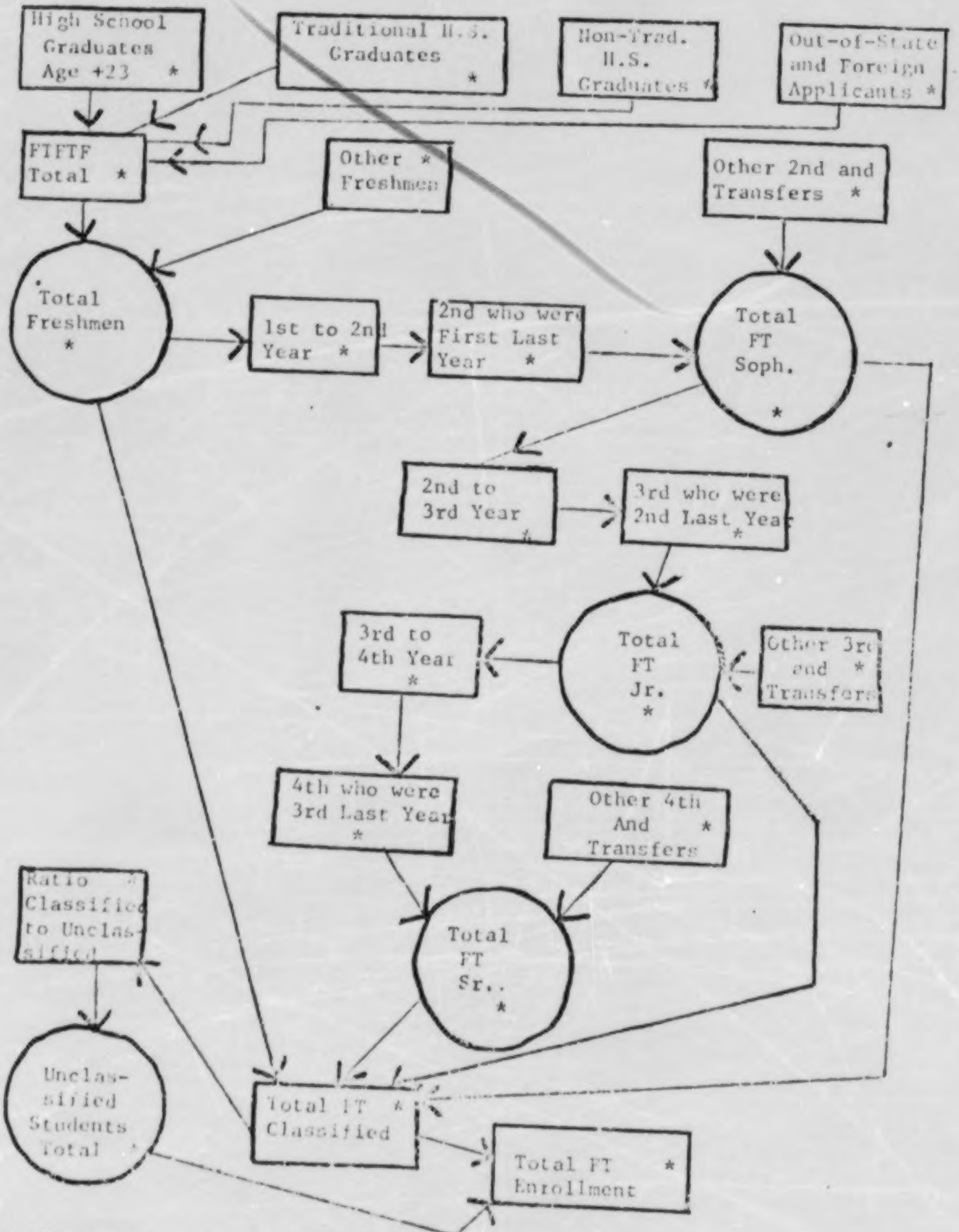
projection for each respective segment in order to produce projections for x year and each succeeding specified year. The resulting data can either be summed for regional projections or left in independent segments for implementation in the model.

As Figure 2 depicts (Katz and Ergin, 1979), the aforementioned independent segment calculations for all regions are integrated with a three year proportional average of out-of-state and foreign applicants (or any policy alternative) in order to produce a FTFTF total. The model then begins to project enrollments for the remaining three years by integrating respective category retention rates, which include other (proportion of readmits, non-degree transfers) and matriculated transfers for each year. The four year total plus the total unclassified (ratio of unclassified by college total classified) are added to produce a total full-time undergraduate enrollment by specified categories per geographic origin.

Part-Time Undergraduate Student Projections

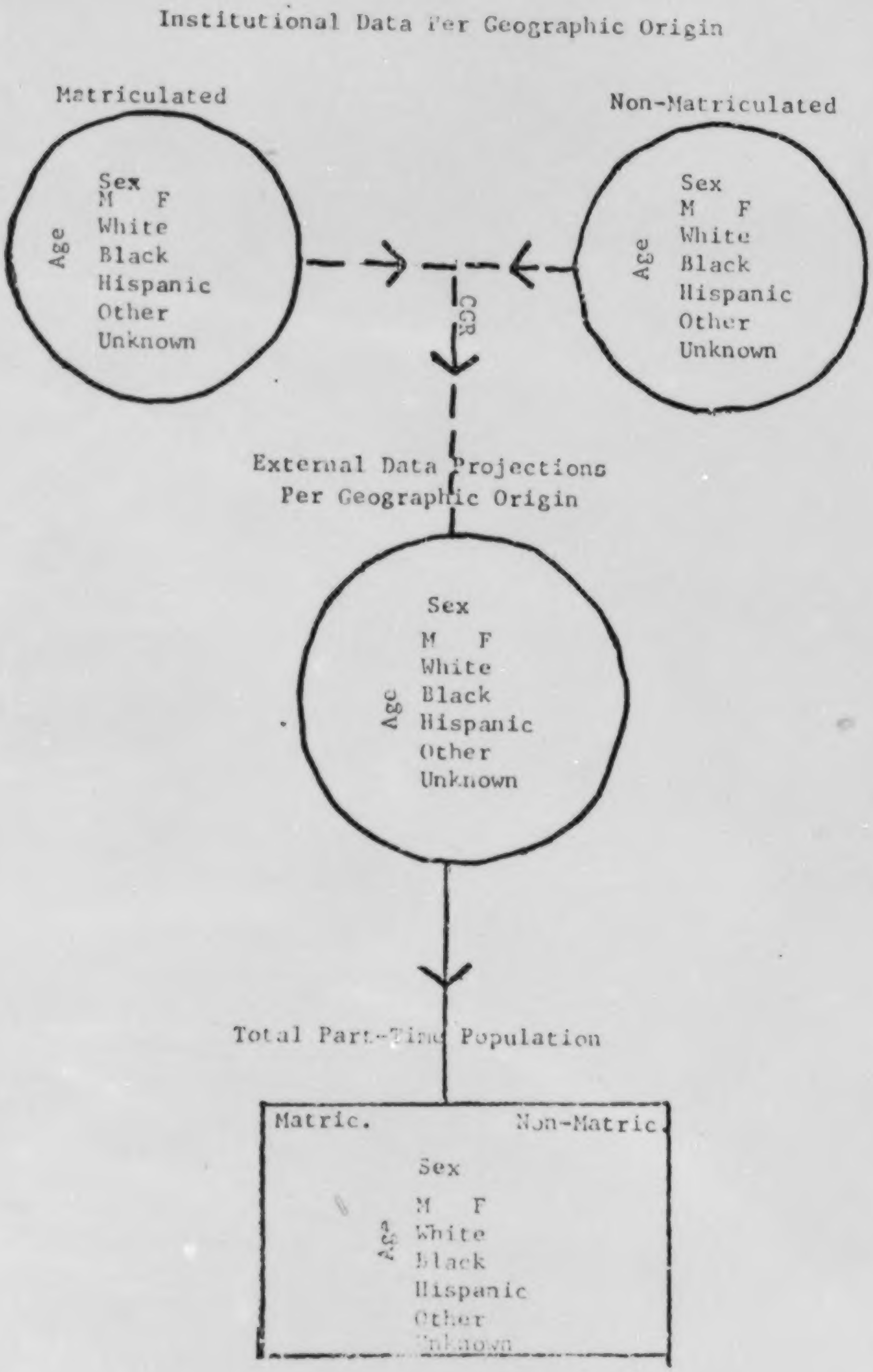
Part-time undergraduate projections are determined by a ratio methodology. Figure 3 depicts the internal and external data integration necessary for part-time in-state projections. It begins by assuming an internal three year average has been respectfully calculated for matriculated and non-matriculated part-time students by the designated categories per geographic origin. This average is then respectfully divided by a similar external three year average (by specified categories) of the general population (per geographic origin), in order to produce a college-going-rate (or historical index) for matriculated and non-matriculated students. This college-going-rate is then multiplied by the external data specified category general population projections in order to produce part-time student projections for x year and each succeeding specified year by matriculation classification. Because of the fluctuations

Figure 2. Cohort Survival Flow Diagram For Full-Time Student Projections


High School Graduates Age +23 *
Traditional H.S. Graduates *
Non-Trad. H.S. Graduates *
Out-of-State and Foreign Applicants *
FTFTF Total *
Other Freshmen *
Other 2nd and Transfers *
Total Freshmen *
1st to 2nd Year *
2nd who were First Last Year *
Total FT Soph. *
2nd to 3rd Year *
3rd who were 2nd Last Year *
3rd to 4th Year *
Total FT Jr. *
Other 3rd and Transfers *
4th who were 3rd Last Year *
Other 4th And Transfers *
Ratio Classified to Unclassified *
Total FT Sr. *
Unclassified Students Total *
Total FT Classified *
Total FT Enrollment *

* Racial Ethnic Sex Age Categories per Geographic Origin (See Katz A. & Ergin, A., 1979)

Figure 3. Ratio Flow Diagram For Part-Time Student Projections


Institutional Data Per Geographic Origin
Matriculated
Sex
M F
White
Black
Hispanic
Other
Unknown
Age
Non-Matriculated
Sex
M F
White
Black
Hispanic
Other
Unknown
Age
CGR
External Data Projections
Per Geographic Origin
Sex
M F
White
Black
Hispanic
Other
Unknown
Age
Total Part-Time Population
Matric.
Non-Matric.
Sex
M F
White
Black
Hispanic
Other
Unknown
Age

in this projection area, it is recommended that institutional policy strategy be incorporated.

Total Undergraduate Student Projections

Total undergraduate student projections can be calculated by adding the total full-time enrollment with the total part-time enrollment by specified categories per geographic origin for each specified projection year. This methodology will yield an approximate total undergraduate student headcount.

This methodology was not designed to be absolutely rigid. Therefore, if an institution is revising admission strategies to focus on key geographic regions, more emphasis may be placed in calculating the college-going-rate in order to project the outcomes of such strategies.

Outcomes and Limitations

The benefits of the model are numerous. It provides institutions with data upon which to base long-range plans and policy alternatives. Specifically such data are useful in developing strategies to guide academic program development; reallocate faculty resources; build new facilities or renovate old ones, and devise new measures for recruitment and retention.

However, there are several limitations. The projections which emanate from this model will only be as accurate as the data employed. Therefore, it may be necessary for the institution to improve the existing student information system or to develop a new one. Second, it is paramount to obtain the most recent geographic population projections. To this end, the 1980 Census is expected to be of considerable assistance; but, beware that it is not in adjudication in key counties. Third, no model can account for all of the variables impacting actual enrollment. Therefore, an error factor should be ascertained by yearly comparisons with actual enrollments. Finally, care must be taken when converting headcount to full-time equivalent students (FTE). FTE's are generated from equalized credit hours and can only be approximated from student headcounts.

References

Carnegie Foundation for the Advancement of Teaching. More than Survival: Prospects for Higher Education in a Period of Uncertainty. San Francisco: Jossey-Bass, 1975.

Dresch, S. P. Demography, Technology, and Higher Education: Toward a Formal Model of Educational Adaptation. J. Pol. Econ., 1975, 83, p. 535-569.

Katz, A., Ergin, A. and Gross, S. A Methodology for Institutional Projections of Full-Time Undergraduate Enrollments, Institutional Research and Creative Change-Papers from the Sixth Annual Meeting of the North East Association for Institutional Research, Cooperstown, New York;NEAIR, 1979.

McPherson, M.S. The Demand for Higher Education. In D. W. Breneman and C. E. Finn, Jr. (eds.), Public Policy and Private Higher Education. Washington, D.C.: The Brookings Institution, 1976.

Shulman, C. H. University Admissions:Dilemmas and Potential. Eric/Higher Education Research Report No. 5. Washington, D.C.:American Association for Higher Education, 1977.

ESTIMATING FALL ENROLLMENTS AND F.T.E.s USING A STUDENT FLOW MODEL

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I. Introduction

The State University of New York Budget Process includes headcount enrollment and Full Time Equivalent (F.T.E.) students as important components. The Instruction and Departmental Research Major Purpose within the budget is enrollment driven and the F.T.E. students serve as the base. Student/Faculty ratios are established and then the number of F.T.E. Faculty positions are allocated.

Within the budget preparation phase, accurate headcount and F.T.E. projections are required for full time and part time students by level (Lower division, Upper division, Beginning Graduate, and Advanced Graduate) and for new students (First Time Freshmen, Undergraduate Transfers and New Graduates).

This paper will discuss two student flow models that were developed to provide enrollment data for the budget submission. Each model is examined in terms of the student components under study, the underlying assumptions, model development and projections and comparisons with actual enrollments.

The calculations required to develop the model parameters were extensive and would normally have required a great deal of computer programming. However, using the REPORTer (REPORT Writer) language, a Burroughs Software product, it was possible to obtain them through a series of English Language commands that generated a COBOL program for execution. No formal COBOL

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knowledge was required to successfully implement these programs on the Burroughs B-4700 and later to modify them for the Burroughs B-6800.

The final section will provide conclusions and discuss some possibilities for future extensions of the models.

II. Model 1

This model was developed in the Spring of 1980 as the first attempt to systematically project Fall headcount as part of the final budget preparation process.

Seven student components make up the entire enrollment within this model. They are:

1. Continuing Students: Undergraduates who have been registered in the current semester who will also enroll in the following semester.
2. First Time Freshmen: Undergraduates who have had no prior College coursework and are attending the institution for the first time.
3. Undergraduate Transfers: Students who have completed some College work, quite often an Associate Degree within the SUNY Community College System, and are attending the institution for the first time.
4. Returning Students: Undergraduates who have previously attended the College, but have not been registered during the most recent semester.
5. Non-degree Undergraduates: Students not currently seeking a Bachelor's Degree, but enrolled at the institution, generally on a part time basis.
6. Matriculated Graduates: Students in a graduate degree program, either a Masters or Certificate of Advanced Study.

7. Non-matriculated Graduates: Students not in a graduate degree program, but who have at least completed an undergraduate degree.

The model concentrates upon Continuing Students, since they make up about 50 percent of the total enrollment, they are currently registered and available for study, and are presumed to have stable enrollment behavior. First Time Freshmen and Undergraduate Transfers are still within the College Decision Process, most Returning students have not applied and most Non-degree and Graduate students have unstable enrollment patterns. As a result, assumptions have been made about these remaining six student groups. First Time Freshmen and Undergraduate Transfers are projected according to headcount figures provided in the preliminary budget development phase. Returning, Non-degree Undergraduates, Matriculated Graduates, and Non-Matriculated Graduates are all estimated based on Fall 1979 enrollment levels.

The model constructed to project Fall 1980 Continuing Student enrollment included eight student segments. These were full time and part time Freshmen, Sophomores, Juniors and Seniors. Possible system states within which members of these student segments could move from Spring to Fall enrollment were considered. They included exit from the system through attrition or graduation; a recycling to the same academic level and full time or part time status; horizontal movement at the same academic level to a different full time or part time status; vertical progression to the next academic level and the same full time or part time status; or a combined vertical progression and horizontal movement to the next academic level and a different full time or part time status. Figure 1 illustrates all of these potential system state changes.

Once these system state changes were identified, it was necessary to develop transition probabilities to indicate the likelihood that any of these state changes would occur for a given student segment. Actual data on students who were registered in Spring 1979 were examined. Eight identical student segments were established and the actual Fall 1979 outcomes were used to measure the likelihood of specific state changes. Table 1 provides a matrix of the potential system states and the actual Spring 1979 to Fall 1979 transition probabilities. Fall 1980 projections for Continuing Students were made based upon the number of students in each segment during the Spring of 1980 times the transition probabilities already established.

Table 2 shows a comparison of the Fall 1980 enrollment projections and the actual Fall 1980 enrollment. For all Continuing Students, the projection was higher than the actual enrollment by 29 students, or 0.6 percent. There are some imbalances in the Lower Division (Freshmen and Sophomores) and Upper Division (Juniors and Seniors) totals, but they almost exactly counterbalance.

Table 3 provides a comparison of the Fall 1980 projections and actual enrollment for all student components. The projection is too high by 469 students, or 5.2 percent and the weakness of some of the assumptions about other student components is evident. Large decreases in the Freshmen and Non-matriculated graduate groups from anticipated totals accounts for the difference.

III. Model 2

This model is an extension of the first model, and it was developed in the late Spring of 1981. One of the enhancements was the increase in student segments from eight to sixteen, by adding sex as an additional discriminatory variable to the previous full time and part time status by academic level. It was hoped that this extra detail would eliminate some of the counterbalancing Lower Division and Upper Division enrollment discrepancies. Another extension was to project F.T.E. totals as well as headcount enrollments, to be of more use in the budget preparation.

The same seven student components were used in this model, but the assumptions were modified for the First Time Freshmen and Undergraduate Transfer components. Both of these groups were estimated based on the current Fall 1981 Admissions data and Fall 1980 actual admissions patterns and percentages including the number of applications, the number and percentage of offers to students, the number and percentage of students accepting the offer and the actual number and percentage of students enrolling.

As in the previous model, the Returning students, Non-degree Undergraduates, Matriculated graduates, and Non-matriculated graduates were assumed to be the same as the previous Fall totals.

Using the sixteen student segments, a similar matrix of potential system state changes was developed for both males and females. Spring 1980 students were separated into these sixteen segments and their actual patterns of enrollment for Fall 1980 were used to establish the transition probabilities. The average student credit hours for each of these segments was calculated for the Fall 1980 students so that the headcount enrollments could be translated into F.T.E. estimates. Average student credit hours were also calculated for the four student components assumed to be stable for Fall 1981.

The Fall 1981 enrollment projections were based on the actual headcount for the sixteen student segments in Spring 1981 times the Spring 1980 to Fall 1980 transition probabilities. F.T.E. estimates were based on these enrollment projections times the average student credit hours for each segment divided by 15 for undergraduates and 12 for graduates.

Table 4 shows the results when Fall 1981 enrollment projections are compared to actual Fall 1981 figures. The total projected headcount is 29 students higher than the actual, for a difference of 0.7 percent. Total male and female projections are close to the actual data and counterbalance each other. Once again, the Lower Division and Upper Division projections are substantially different from the actual data, but again they offset one another almost exactly.

Table 5 provides comparisons of all of the projected and actual student components. The total projected enrollment is less than the actual data by 37 students or 0.5 percent. The projections for Freshmen and Transfers are more accurate using previous admissions experience in this model, although lower than the actual by almost 200 students. These are nearly offset by the slight overprojection of Continuing Students and decreases in the Returning, Non-degree undergraduate and Non-matriculated graduate populations in Fall 1981.

Table 6 illustrates the comparison of projected and actual F.T.E.s for Fall 1981 Continuing Students. Since each full time student is almost exactly one F.T.E. student, the same description holds true. The totals are almost exact, with a difference of 36 F.T.E.s or 0.9 percent, and the offsetting Lower Division and Upper Division discrepancies.

Table 7 examines the F.T.E.s for all seven projected and actual student components. The higher Freshmen and Transfer actual figures are offset by the higher Continuing Student projection and decreases in Returning, Non-degree undergraduates and Non-matriculated graduates. The final figure is 35 F.T.E.s more than projected, or a difference of 0.5 percent.

IV. Conclusion

The results of projecting headcount and F.T.E. enrollments for Continuing Students and for the total College has been quite accurate in the aggregate, although still somewhat suspect for the more detailed levels. Additional efforts could be focused upon the internal parts of the

Continuing Student component to see if the Lower Division and Upper Division totals could be improved. The revised assumptions for Freshmen and Transfers in Model 2 were more accurate than in Model 1 and more time could be spent on these two components to bring them into the model along with Continuing Students. Returning, Non-degree undergraduates, Matriculated graduates, and Non-matriculated graduates seem destined to continue as assumptions rather than specifically calculated.

FIGURE 1: SPRING TO FALL SYSTEM STATE CHANGES

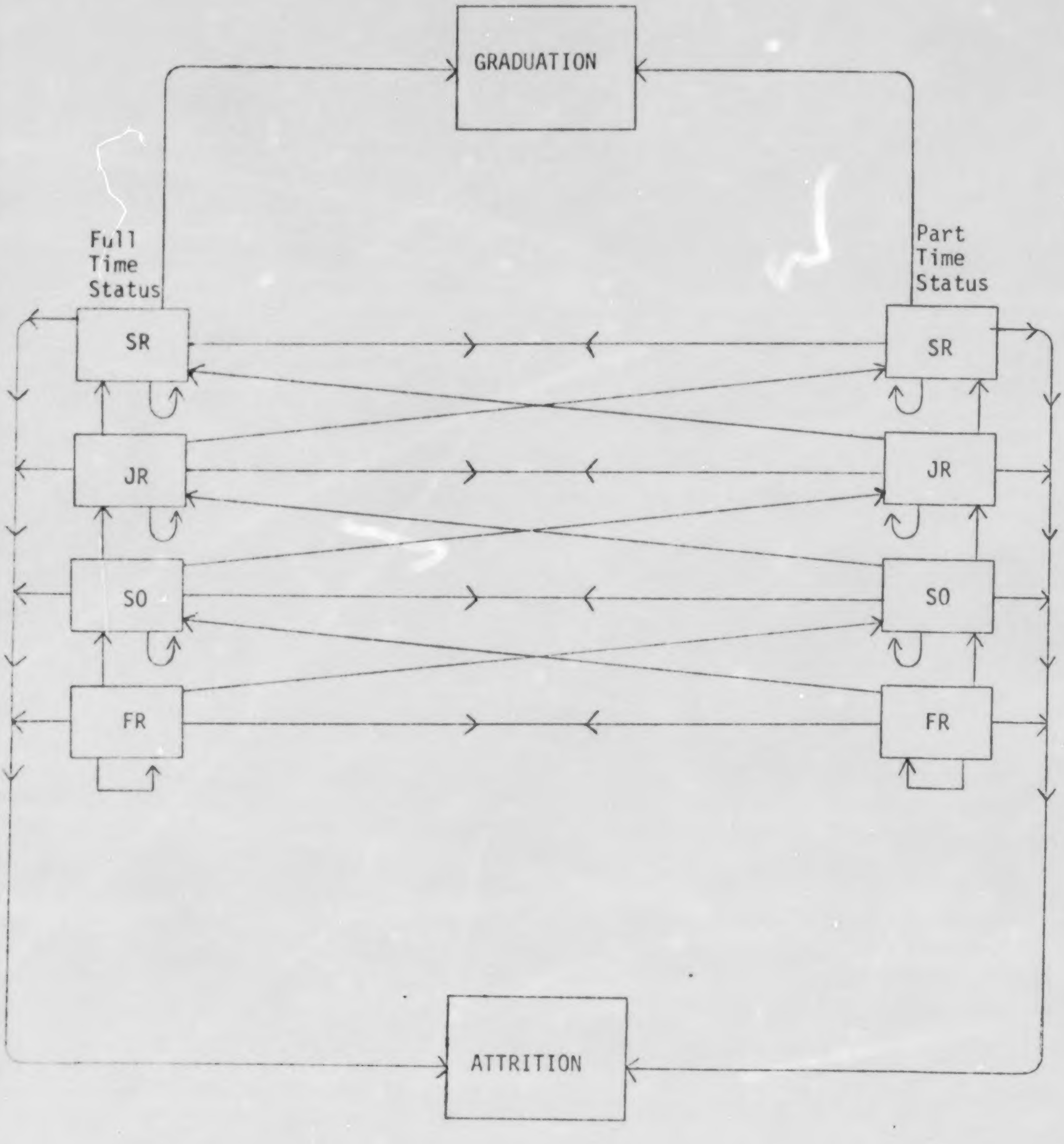
GRADUATION
Full Time Status
Part Time Status
SR
JR
SO
FR
SR
JR
SO
FR
ATTRITION

TABLE 1: POSSIBLE SYSTEM STATES AND SPRING 1979 TO FALL 1979 ACTUAL TRANSITION PROBABILITIES

	FALL 1979									
SPRING 1979	ATTRITION	FT FR	PT FR	FT SO	PT SO	FT JR	PT JR	FT SR	PT SR	GRAD
FT FR	.248	.216	.010	.515	.011					
PT FR	.379	.223	.252	.078	.068					
FT SO	.251			.275	.017	.447	.010			
PT SO	.386			.267	.218	.069	.060			
FT JR	.101					.279	.009	.572	.015	.024
PT JR	.261					.231	.329	.097	.067	.015
FT SR	.033							.241	.040	.686
PT SR	.189							.115	.250	.446

TABLE 2: HEADCOUNT COMPARISONS FOR FALL 1980 CONTINUING STUDENTS

	FALL '80 PROJ	FALL '80 ACTUAL	DIFFERENCE N	DIFFERENCE %
Lower Division	2,001	2,201	+200	+10.0
FT	1,880	2,071	+191	+10.2
PT	121	130	+ 9	+ 7.4
Upper Division	2,501	2,272	-229	- 9.2
FT	2,296	2,035	-261	-11.4
PT	205	237	+ 32	+15.6
Total	4,502	4,473	- 29	- 0.6
FT	4,176	4,106	- 70	- 1.7
PT	326	367	+ 41	+12.6

TABLE 3: HEADCOUNT COMPARISIONS FOR ALL FALL 1980 STUDENT COMPONENTS

	FALL '80 PROJ	FALL '80 ACTUAL	DIFFERENCE N	DIFFERENCE %
Freshmen	1,590	1,259	-331	-20.8
Transfer	730	838	+108	+14.8
Continuing	4,502	4,473	- 29	- 0.6
Returning	215	178	- 37	-17.2
Non-Degree	647	659	+ 12	+ 1.9
Total Undergraduate	7,684	7,407	-277	- 3.6
Matriculated Graduate	573	568	- 5	- 0.9
Non-Matriculated Graduate	845	658	-187	-22.1
Total Graduate	1,418	1,226	-192	-13.5
Total College	9,102	8,633	-469	- 5.2

TABLE 4: HEADCOUNT COMPARISONS FOR FALL 1981 CONTINUING STUDENTS

	FALL '81	FALL '81	DIFFERENCE	
	PROJ	ACTUAL	N	%
Lower Division	1,636	1,914	+278	+17.0
FT Males	767	894	+127	+16.6
PT Males	32	37	+ 5	+15.6
FT Females	781	910	+129	+16.5
PT Females	56	73	+ 17	+30.4
Upper Division	2,572	2,265	-307	-11.9
FT Males	1,106	1,000	-106	- 9.6
PT Males	116	111	- 5	- 4.3
FT Females	1,224	1,036	-188	-15.4
PT Females	126	118	- 8	- 6.3
Total	4,208	4,179	- 29	- 0.7
FT Males	1,873	1,894	+ 21	+ 1.1
PT Males	148	148	----	-----
FT Females	2,005	1,946	- 59	- 2.9
PT Females	182	191	+ 9	+ 4.9
Total FT	3,878	3,840	- 38	- 1.0
Total PT	330	339	+ 9	+ 2.7

TABLE 5: HEADCOUNT COMPARISONS FOR ALL FALL 1981 STUDENT COMPONENTS

	FALL '81	FALL '81	DIFFERENCE	
	PROJ	ACTUAL	N	%
Freshmer	1,018	1,088	+ 70	+ 6.9
Transfers	700	829	+129	+18.4
Continuing	4,208	4,179	- 29	- 0.7
Returning	201	182	- 19	- 9.5
Non-Degree	659	586	- 73	-11.1
Total Undergraduate	6,786	6,864	+ 78	+ 1.1
Matriculated Graduate	568	590	+ 22	+ 3.9
Non-Matriculated Graduate	658	595	- 63	- 9.6
Total Graduate	1,226	1,185	- 41	- 3.3
Total College	8,012	8,049	+ 37	+ 0.5

TABLE 6: F.T.E. COMPARISONS FOR FALL 1981
CONTINUING STUDENTS

	FALL '81 PROJ	FALL '81 ACTUAL	DIFFERENCE N	%
Lower Division	1,601	1,853	+252	+15.7
FT	1,562	1,809	+247	+15.8
PT	39	44	+ 5	+12.8
Upper Division	2,479	2,191	-288	-11.6
FT	2,377	2,092	-285	-12.0
PT	102	99	- 3	- 2.9
Total	4,080	4,044	- 36	- 0.9
Total FT	3,939	3,901	- 38	- 1.0
Total PT	141	143	+ 2	+ 1.4

TABLE 7: F.T.E. COMPARISONS FOR ALL STUDENT COMPONENTS

	FALL '81 PROJ	FALL '81 ACTUAL	DIFFERENCE N	%
Freshmen	1,011	1,073	+ 62	+ 6.1
Transfers	691	770	+ 79	+11.4
Continuing	4,080	4,044	- 36	- 0.9
Returning	158	139	- 19	-12.0
Non-Degree	258	236	- 22	- 8.5
Total Undergraduate	6,198	6,262	+ 64	+ 1.0
Matriculated Graduate	273	285	+ 12	+ 4.4
Non-Matriculated Graduate	257	216	- 41	-16.0
Total Graduate	530	501	- 29	- 5.5
Total College*	6,878	6,913	+ 35	+ 0.5

* Additions of 150 F.T.E.s for CAS and Overseas Programs

A MODEL FOR PROJECTING TENURE DENSITY AT THE INSTITUTIONAL LEVEL*

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INTRODUCTION

A national survey on higher education in 1969 revealed that 53 percent of the faculty in public and 45 percent of those in private institutions were tenured (Trow, 1973). A similar survey a decade later pointed out that the percentage of tenured faculty had increased to 60 percent and 63 percent for public and for private institutions, respectively (American Council on Education, 1981). This same survey revealed also that the rate of new tenures was 58 percent of those considered.

Undoubtedly, academic tenure is the characteristic form for organizing professional teaching and scholarly service in higher education. Supporters of tenure argue that it provides a means of assuring faculty quality, educational excellence, and academic freedom. Opponents, however, argue that academic tenure protects incompetence, impairs academic innovation, and reduces faculty accountability (Furniss, 1973; Keast and Macy, 1973; Maeroff, 1980; Trow, 1973). A recent report (National Academy of Sciences, 1979) argues that a maturing faculty profile reduces the rate of research innovation, inhibits the inflow of new ideas, and discourages able and creative people from pursuing academic careers. One might argue that, at

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the institutional level, a high tenure ratio reduces faculty turnover and represents a threat to an institution's vitality, capability to respond to new demands, and the quality of service. Hence, the institutional interest in maintaining reasonable levels of tenure ratios.

The purpose of this paper is to provide a methodology whereby an institution can project the effects of alternative policies and practices on faculty tenure ratios. Specifically, we present a mathematical model designed to answer questions of the following type: Given an institution's existing policy for granting tenure and assuming a steady-state environment, what is likely to be the proportion of its faculty who are tenured in the years ahead? Given a steady-state environment, what effect would the rate of new tenures and retirement age (or any other variable in the model) have on the ratio of the tenured faculty for the years ahead?

THE MODEL

A model is a representation or conceptualization of the relationships assumed to exist among a set of phenomena. Every model is, in effect, a theoretical prototype which presumes to describe the primary components of the thing being modeled and to explain the relationships among them. The emphasis of the model presented in this paper is on projecting tenure ratios for relatively large numbers of faculty members (e.g., for the total institution or for large schools within an institution). The projection is made on the basis of "transition ratios" for the categories of personnel included in the model (Hopkins, 1974). Thus, the numbers of personnel who serve in each of a finite number of discrete categories in one period are determined by adding to the numbers serving in the previous period the figures specified by the assumed transition ratios. In essence, then, the model assumes a process in which tenured faculty in year t+1 are related to tenured faculty in year t by means of specified transition ratios.

Two major assumptions underlie the model presented here. First, historical trends in granting tenure and retirement/termination rates will continue to apply for the period for which the projection is made. Second, the age distribution of tenured faculty does not change for the period for which the projection is made.

Properties of the Model

Typically, a flow model of tenured faculty is based on assumptions regarding retention/attrition rates of tenured faculty and rate of new tenures. The retention/attrition rates are affected by natural factors (e.g. deaths and voluntary resignations) and by mandatory provisions (e.g. regulations with respect to retirement age). The rate of new tenures reflects the existing policy in granting tenure. In working out the formulation of the model, the following components have been defined: Tenured faculty, non-tenured faculty, new tenures, mandatory retirements of tenured faculty, other retirements of tenured faculty (resignations, deaths) and tenure track faculty lines. On the basis of these components the following equation was developed to estimate the ratio of tenured faculty for a given year:

$$\begin{array}{c}\text{\% tenured faculty}\\ \text{for year } t+1\end{array} = \frac{T_1 + T_2 - (PR + OT)}{TTF}\,100$$

where:

T_1=Tenured faculty (number of faculty who currently have tenure)

T_2=New tenures (number of faculty who get tenure at the end of their term appointment

PR=Projected retirement (number of faculty expected to retire, based on a mean value of retirement age after other terminations (see below) have been taken into account)

OT=Other terminations (number of people who are expected to leave other than retirement, e.g. resign, death)

TTF=Tenure track faculty (number of full-time faculty excluding lecturers).

Assumptions of the Model

Projections depend for their validity on the accuracy of the assumptions on which they are based. Assumptions may be challenged or they may be proved false by events, but they represent the best judgment of the person making the projection, based on past experience and present reality. Specifically, the following set of assumptions was adopted for the purposes of delineating the model outlined above:

1) Given the 1978 amendments to the "Age Discrimination in Employment Act" and the recent inflation rates, faculty members are likely to postpone their retirement (Furniss,1981; Watkins, 1980). For the different scenarios of projections attempted in this paper, and in order to highlight the likely effects of postponing retirement, two different values for mean retirement age (65 and 70) were adopted.
2) The rate of new tenures was set to be either 5 or 10 percent of the non-tenured faculty.
3) Other terminations for tenured faculty were set to equal one per year.
4) All non-renewals and all retirements/terminations were assumed to be replaced with non-tenured faculty.
5) The number of tenure track faculty lines was set to equal 690; furthermore, it was assumed that no retrenchment decision was to be made for the period for which the projection was made.

Application of the Model

The above model was applied to project the tenure ratio of a hypothetical higher education institution for the decade 1980-1990. The following specific assumptions have been adopted for this application:

Number of tenured faculty: 515

Number of non-tenured faculty: 200

Number of new tenures: Either 5% or 10% of the non-tenured faculty

Frequency of retirements of tenured faculty: A set of numbers (see Tables 1 and 2), obtained on the basis of the following equation and a hypothetical age distribution:

$$\text{Year of Retirement} = \text{Year of birth} + \text{Mean retirement age(either 65 or 70)}$$

Number of other terminations of tenured faculty: 1 per year

Based on the assumption of 10 percent new tenures and a non-tenured faculty of 200 people, the frequency of new tenures amount to 20. Adding this figure to 515 (people who already have tenure) raises the number of tenured faculty to 535 and reduces the numbers of non-tenured faculty to 180. At the same time 4 retirements and 1 termination have been estimated to occur in 1980-81, all tenured faculty members. The net total of tenured faculty members, therefore, is obtained through the equation 515+20-5=530. On the basis of the assumption that all new appointments are without tenure, the final total of non-tenured faculty becomes 185 (180+5=185). This process is repeated for the succeeding years. Two scenarios of projections have been developed based on the assumption that 10 percent of the non-tenured faculty get tenure each year and using 65 and 70 as mean retirement age. Table 1 summarizes the results of the two scenarios in two-year interval periods.

To study the effects of policy change in one of the components of the model, another two scenarios of projections were obtained through holding constant all other assumptions except the rate of new tenures which was set to be 5 percent of the non-tenured faculty. Table 2 summarizes the results of the additional two scenarios of projections,again in two-year interval periods.

Table 1

Tenure Ratios for the Period 1980-1990 Based on Rate of New Tenures 10 Percent of the Non-tenured Faculty and Mean Retirement Age either 65 or 70

		1980-81	1982-83	1984-85	1986-87	1988-89	1990-91
Tenured faculty	a	515	533	543	547	555	546
	b	515	546	570	583	582	580
Non-tenured faculty	a	200	182	172	168	160	169
	b	200	169	145	132	133	135
New tenures	a	20	18	17	17	16	17
	b	20	17	15	13	14	14
Retirements	a	4	11	13	16	12	16
	b	1	2	10	15	13	15
Terminations		1	1	1	1	1	1
Tenure track faculty lines		690	690	690	690	690	690
% tenured faculty	a	74.6	77.2	78.7	79.3	80.4	79.1
	b	74.6	79.1	82.6	84.5	84.3	84.1

[a] Mean retirement age 65

[b] Mean retirement age 70

Table 2

Tenure Ratios for the Period 1980-1990 Based on Rate of New Tenures 5 Percent of the Non-tenured Faculty and Mean Retirement Age either 65 or 70

		1980-81	1982-83	1984-85	1986-87	1988-89	1990-91
Tenured faculty	a	515	514	508	499	495	476
	b	515	528	537	539	529	520
Non-tenured faculty	a	200	201	207	216	220	239
	b	200	187	178	176	186	195
New tenures	a	10	10	10	11	11	12
	b	10	9	9	9	9	10
Retirements	a	15	11	13	16	12	16
	b	4	2	10	15	13	15
Terminations		1	1	1	1	1	1
Tenure track faculty lines		690	690	690	690	690	690
% tenured faculty	a	74.6	74.5	73.6	72.3	71.7	69.0
	b	74.6	76.5	77.8	78.1	76.7	75.3

[a] Mean retirement age 65

[b] Mean retirement age 70

Figure 1 depicts graphically the four scenarios of the projections obtained through the application of the model. As Figure 1 reveals, the most optimistic scenario for the institution under consideration is a mean retirement age of 65 and rate of new tenures 5 percent of the non-tenured faculty --in fact, probably two unrealistic assumptions. Only in the case of this scenario will the tenure ratio remain initially steady and then start dropping gradually but slowly. With mean retirement age 70 and rate of new tenures 5 percent of the non-tenured faculty the ratio of tenured faculty increases for the first half of the decade and then it declines slightly; however, the tenure ratio still remains around 75 at the end of the decade. The worst scenario from the institutional point of view appears to be the one with mean retirement age 70 and rate of new tenures 10 percent of the non-tenured faculty; under this scenario, the ratio of tenured faculty would peak at above 80 percent by the end of the first half of the decade and it will remain that high. The remaining scenario (mean retirement age 65 and rate of new tenures 10 percent) reflects a relatively steady tenure ratio around 75.

DISCUSSION

The model discussed in this paper is intended to help project the tenure density for an institution given its existing policy. It is also possible, through holding constant the rest of the variables in the model, to study the likely effects of one or more variables on the tenure ratio for the years ahead. The model, therefore, can support the institutional planning process. Certain observations are warranted in the light of the application of the model.

First, once an institution reaches a relatively high percent of tenured faculty, it will take a number of years for the ratio of tenured faculty to drop to reasonable levels. A tenure ratio of 74.6 percent during 1980-81 was assumed for the institution under consideration. The model revealed that if the existing tenure policy continues unchanged, then the tenure density

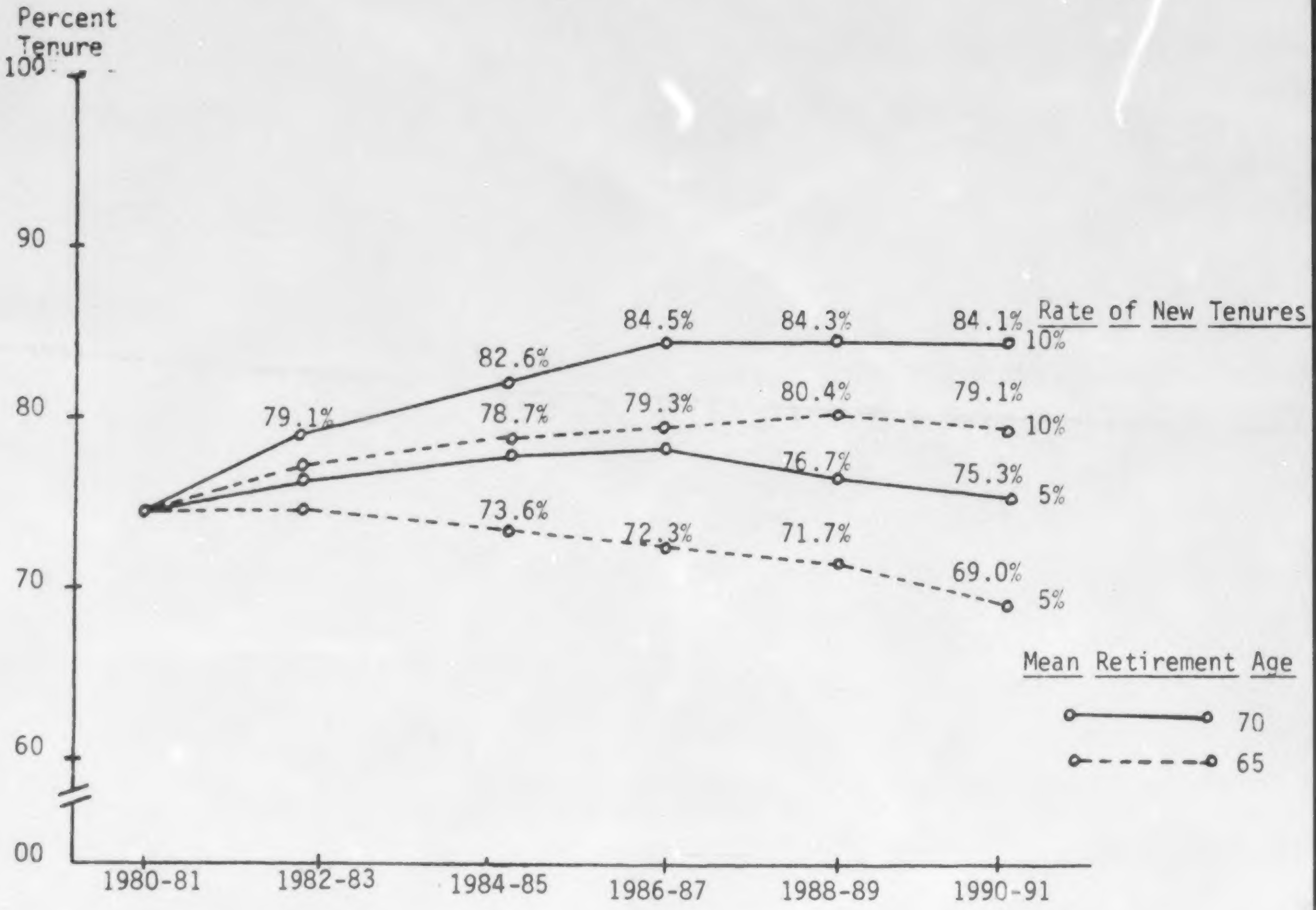

Figure 1: Four Scenarios of Projections of Tenure Ratios for the Period 1980-1990 Based on Mean Retirement Age either 65 or 70 and Rate of New Tenures either 5 or 10 Percent of the Non-tenured Faculty

of this institution will well exceed 80 percent in the next decade. Even if a substantial policy change is initiated, (i.e., considerably lower rate of new tenures and retirement at the age of 65), it will take at least 5 years for the tenure ratio to start declining.

Second, if a retirement age higher than the current one is adopted by tenured faculty members as a result of the recent amendments to the Age Discrimination Employment Act--and evidence is already building which points to this direction--then the likely effect will be a drop in the frequency of retirements expected for the next five years and, therefore, an increase in the tenure ratio will take place. Even if the rate of new tenures is maintained at low levels, it will take a number of years for the tenure ratio to start dropping when retirement age is extended beyond 65.

Third, the above projections were based on a steady-state environment. Nevertheless, the experience of the past decade points to a turbulent rather than a steady-state environment for higher education. Certain institutions of higher education suffered severe budget cuts during the past decade because of more general economic stringencies or because of declinging enrollment. Others were forced to make painful retrenchment decisions (Dougherty, 1981; Watkins, 1981). There is every likelihood that the economic stringency for higher education will be an everpresent condition for the next decade as well. To the extent that budget cuts or retrenchment decisions reduce the number of tenure track lines or affect mainly the non-tenured faculty members, the tenure ratio will rise accordingly.

REFERENCES

Dougherty, E. Should you starve all programs or eliminate a few? New Directions for Institutional Research, 1980, No. 30, pp. 9-23.

Furniss, T. New opportunities for faculty members. Educational Record, 1981, 62, 1-8.

Furniss, T. Steady-state staffing on tenure-granting institutions and related papers. Washington, D.C.:American Council on Education,1973.

Hopkins, D. S. Analysis of faculty appointment, promotion, and retirement policies. Higher Education, 1974, pp. 397-418.

Keast, W. & Macy, J. Faculty tenure. San Francisco: Jossey Bass, 1973.

Maeroff, G. Colleges pondering more flexible alternatives to tenure. The New York Times, August 12, 1980.

Trow, M. The distribution of academic tenure in higher education. In B. Smith (Ed.) The tenure debate. San Francisco: Jossey Bass, 1973.

Watkins, B. Michigan state university offers options to professors who are to loose their jobs. The Chronicle of Higher Education, June 22,p.2,1981.

Watkins, B. Professors plan to delay retirement when new law is applied to them. The Chronicle of Higher Education, September 15,1980.

Research excellence through the year 2000: The importance of maintaining a flow of new faculty into academic research. Washington, D.C. National Academy of Sciences, 1979.

Tenure of public and private four-year colleges and universities. Educational Record, Winter 1981.

How Students Change: A Longitudinal Study

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INTRODUCTION

The last decade has been a difficult one for higher education. Colleges have been plagued by budget cuts, in response to an interaction between an increasingly inflationary economy and declining population rates. Competition between universities and colleges has escalated, and legislators, and the public at large, have put increasing pressure for accountability on institutions of higher learning. Researchers in higher education have responded with attempts to measure college impact. The questions posed are: 1) do students change? 2) if so, in what ways do they change? and, 3) are these changes due to maturation, or can they be attributed to the college experience? The present study is an attempt to answer these questions for one four-year public institution.

Comparisons between freshmen and seniors can be made in several ways. Most researchers have chosen the cross-sectional method, based on necessity. It takes four years of consistent data collection in order to complete the more rigorous method of analysis: the panel or longitudinal study. Some researchers have used a compromise method, the cohort analysis, which involves drawing random samples from the freshman class and, four years later, from the corresponding senior class (see Endo and Harpel 1980).

Astin (1977) maintains that there are two minimal requirements for adequately designed studies of college impact: 1) multi-institutional data, and 2) longitudinal data. Astin's study, conducted by the Cooperative Institutional Research Program (CIRP), meets both of these criteria. His extensive surveys measure a variety of self-reported traits, abilities, behaviors, and demographic variables. He concludes that, after entering college, students "develop a more positive self-image, as reflected in greater interpersonal and intellectual competence...." Because of the inherent difficulties and length of time required to collect longitudinal data, the availability of other research results of this type is sparse.

The purpose of the present study was to augment research of the panel-study variety. The authors were fortunate to have outcomes data available that made it possible to trace the same students over four years on the same variables. The freshman classes of 1976 and 1977 could be tracked, which provided a unique opportunity to replicate results in the same institution. Self-perceptions of 34 traits and abilities were compared between the freshman and senior years on the same students. Using the best of the methods available, the present study addressed the first two questions, "do students change; and, in what ways?"

The third question was approached more indirectly. One way of eliminating maturation as an explanation for change in college students over a four-year period is to look at the differential effects of various curriculums in the same college. If the college experience, particularly the academic aspect of the college, has an impact; students majoring in different fields should vary in the types of changes or growth they perceive and show. Several studies have reported results consistent with this hypothesis. Endo and Harpel (1980), using a cohort analysis, found that type of academic program had some impact on fourteen variables. A four-year study at Union College, conducted by C. W. Huntley, is described by Feldman and Newcomb (1980) as providing "the most convincing documentation that we have seen for drawing an important conclusion: experiences of majoring in different fields had different effects on individual's values, even though their previously highest values were the same." And, Green and Morlock (1979), using self-reports by seniors on the amount of impact of the college experience, found that students in five different curriculums could be discriminated from each other based on profiles of their responses. The sharpest differences between majors occurred in their ratings of the impact of courses in their major, which suggests experiences in the classroom do create change in students who reach the senior year. Furthermore, aggregating the data tended to wash out the effects observed; i.e., when looking at the whole senior class, students appeared to rate themselves consistently in the average range, while, in fact, different majors experienced varying amounts of growth.

For this study then, it was decided that, in addition to observing change for the class as a whole, the sample would be divided into students enrolled in professional or vocationally-oriented programs and those in traditional liberal arts majors. Comparisons of the kinds of change made in the self-perceptions of these two categories of majors could help attribute changes to the college environment. This grouping paralleled that of another study by Green and Morlock (1980), which examined alumni self-reports of college impact. A similar division was made by Endo and Harpel (1980), who found that college experience seemed to have a more broadening effect for liberal arts students.

HISTORY

Since 1973, the SUNY College at Plattsburgh has been involved in a study of freshmen, seniors, and alumni. Starting with the students who graduated in 1977-78, it was possible to conduct the first of a series of longitudinal studies relating student expectations as freshmen to their sense of achievement as seniors. With the exception of a few examples of social and personal development, freshman expectations exceeded senior self-perceived achievements in all of the areas surveyed.

Attempts at interpretation of these results raised several questions: were students' achievements falling short of students' expectations because the college actually had little or no impact on student growth, or, on the contrary, were student expectations unrealistically high? A panel study that compared input and output measures on the same students could provide an answer to this question and offer more direct evidence of college impact.

Accordingly, in 1979-80, emphasis was shifted in the senior survey to follow up on the self-perceptions of various traits and abilities. Starting in 1976, freshmen had been asked to rate themselves on a 5-point scale from 1 = lowest 10%, 3 = average, 5 = highest 10%, as compared to their peers on 34 traits and abilities. These items were based partly on Pace's work (1975), as well as additional personality variables and abilities expected to benefit from college experience. The current study is restricted to a description of change as evidenced by the perceptions of a panel of entering freshmen who graduated after four years and who had comparable survey data from both years.

METHOD

Panel Study

The Sample: Two groups of students satisfied the criteria for the longitudinal study; i.e., both freshman and senior survey data were available. There were 155 students who entered as freshmen in 1976, graduated during the 1979-80 academic year, and who filled out both a Freshman Survey and a Senior Survey. A corresponding cohort of 140 freshmen, entering in 1977, met comparable conditions. Table 1 displays the characteristics of these two groups, and compares each group to the other graduating seniors who were native freshmen, but who were missing either a Freshman Survey, a Senior Survey, or both.

The groups included in the study were not randomly selected, but were chosen only on the basis of available data. The Freshman Survey was administered during the Summer Orientation; the Senior Survey was given to seniors at the time they applied for graduation. In the years under study, 1976 and 1977 for freshmen, there were 498 and 871 freshman questionnaires collected, respectively. Those who completed surveys had higher high school averages and were more likely to be female. This is consistent with other findings, which tend to support the contention that women are more compulsive when filling out surveys; and, at least at Plattsburgh, have higher academic quality indicators than men. This same effect is noticeable in the group of seniors who filled out a Senior Survey. We conclude, therefore, that our results are somewhat biased in that they are based on a higher proportion of female graduates, with higher than average measures of academic achievement.

This sexual bias is not evident, however, in the 34 longitudinal items used in the present research. No significant differences were found between the panel group and the other freshmen on these traits and characteristics or on most of the other survey items. Furthermore, when sex, high-school average, and initial freshman rating were partialed out of the analysis of career-oriented versus liberal arts majors, significant relationships between the program type and the distinctive items remained. Therefore, if this bias affected the results, it was in an indirect way, through some other mediating variable.

In order to obtain a more stable, representative sample, with regard to curricula, and to increase sample size when dividing the panel group into career-oriented and liberal arts subgroups, the 1976 and 1977 panel groups were combined into one sample. Before this merger was accomplished, the panel groups for the two years were compared, using t-tests. The two classes differed on only a few variables. Significant differences occurred in less than the number of variables expected by chance. None of the differences involved the longitudinal items studied, with the exception of academic and math abilities. These were higher in the smaller, more select 1976 class, and the self-perceptions of these students accurately matched their actual superior abilities. The two separate years were also analyzed individually, providing stronger conclusions through replication of findings.

Comparisons between liberal arts and career-oriented majors, then, were made on the combined panel group. This division was based on the curriculum indicated at the time of graduation or final senior semester. Double majors and majors that were interdisciplinary or did not fit clearly into either category were eliminated from this comparison (see Table 2).

RESULTS

The majority (79% and 85%) of the 34 comparable freshman/senior items describing traits and abilities showed significant* ($p < .05$) increases in senior ratings. There was a high degree of replication in the two years studied, with only three items showing inconsistent results. In other words, 27 of the 34 items showed consistent, significant* increases from freshman to senior year for the two classes studied. The only items that showed no significant change in either of the years surveyed were *athletic ability, math ability, literary acquaintance, and impulsiveness.* The correlations between the freshman and senior ratings were all significant, ranging from a low of .16 *(ability to see relationships, similarities, and differences between ideas)* to a high of .70 *(mathematical ability).* The differences in means ranged from -.10 *(impulsiveness)* to .43 *(tolerance of others).*

The increased number of cases (295) in the combined sample produced similar results. Three of the 34 items were not significantly different,

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* Comparisons were made, using a paired-comparison, two-tailed t-test.

Table 1. Characteristics of Panel Group vs. Other Graduating 4-Year Students.

	1976 - 1980			1977 - 1981		
	Panel Group Mean		Other Mean	Panel Group Mean		Other Mean
SEX	1.81	*	1.60	1.76	*	1.64
HSAvg	87.78	*	86.00	85.34		85.04
SAT Verbal	482		472	444		450
SAT Math	536		529	496		503
GPA	3.10	*	2.98	3.08	*	2.94
SEX	%		%	%		%
Male	18.9		39.8	23.7		36.0
Female	81.1		60.2	76.3		64.0

Table 2. Composition of Career-oriented and Liberal Arts Panel Groups.

Professional Studies	%	Liberal Arts	%
Business	10	Fine Arts	2
Computer Science	2	Humanities	4
Education	15	Social Sciences	14
Home Economics	9	Science & Math	12
Nursing	12		
Other Health Science	7		
	55%		32%

Table 3. Results of Paired Comparison t-tests on Combined Group (1977 & 1976 Cohorts) - Freshman vs. Senior Responses.

*Listed in order of t value (df = 294). Fr ⊢—⊣ Sr

GAINS	t	Means of Freshman & Senior Responses SCALE: 2.5 3.0 3.5 4.0		
1) Social Development	9.32	3.43	3.86	1)
2) Reasoning Ability	9.03	3.35	3.76	2)
3) Personal Development	8.59	3.55	3.90	3)
4) Leadership Ability	8.56	3.27	3.71	4)
5) Ability to Handle Stress	8.45	3.43	3.86	5)
6) Ability to See Relationships	8.34	3.41	3.79	6)
7) Self-confidence (Social)	8.28	3.11	3.51	7)
8) Understanding Science	7.72	3.02	3.37	8)
9) Critical Thinking	7.59	3.25	3.62	9)
10) Public Speaking Ability	7.56	2.72	3.12	10)
11) Mechanical Ability	7.36	2.55	2.92	11)
12) Tolerance of Other People	7.20	3.63	4.01	12)
13) Personal Organization	6.73	3.54	3.88	13)
14) Artistic Ability	6.64	2.61	2.93	14)
15) Independence	6.46	3.59	3.92	15)
16) Self-confidence (Intellectual)	6.32	3.34	3.65	16)
17) Awareness of Different Philosophies	5.94	3.31	3.60	17)
18) Originality	5.40	3.30	3.55	18)
19) Academic Ability	5.32	3.61	3.83	19)
20) Persistence	5.16	3.52	3.78	20)
21) Drive to Succeed	4.70	3.74	3.97	21)
22) Writing Ability	4.58	3.21	3.41	22)
23) Vocabulary, Facts in Various Fields	4.47	3.21	3.40	23)
24) Optimism	4.18	3.47	3.69	24)
25) Popularity	4.08	3.24	3.41	25)
26) Development of Friendships	3.48	3.79	3.97	26)
27) Aesthetic Sensitivity	3.17	3.39	3.57	27)
28) Appreciation of Religion	2.75	3.37	3.53	28)
29) Reading Ability	2.67	3.57	3.69	29)
30) Athletic Ability	2.07	3.19	3.27	30)
NO CHANGE				
31) Quantitative Thinking	1.53	2.97	3.05	31)
32) Literary Acquaintance	1.18	3.11	3.17	32)
33) Math Ability	.76	3.23	3.27	33)
LOSS				
34) Impulsiveness	-1.96	3.14 (–) SR	FR 3.25	34)

and for one item *(impulsiveness)* a significant decline in freshman to senior ratings was found. Table 3 displays the items, ordered by the value of t, showing the relative freshman and senior ratings and the magnitude of the change in mean ratings.

It is possible that greater change might have been observed for the majority of the variables, had the range of responses allowed for more variation. A 5-point scale was used throughout the questionnaire. Students were required to compare themselves to their peers within the limits of the lowest 10% ("1") to the highest 10% ("5"). It is not unreasonable to suggest that the typical college freshman considers himself or herself, if not in the top 10%, at least above average on many of the traits and abilities contained in the survey. This is substantiated by the mean responses, which are higher than "average" (3.0) in 91% of the cases. There were only four items with a below average ($<$ 3.0) mean. Three of these items, *artistic ability, mechanical ability, and public speaking ability,* were among those showing the largest increases from the freshman to the senior year.

There is evidence that there is a ceiling effect in operation for some items, which is preventing a greater increase in senior ratings. These are variables with a large number of top freshman ("5") ratings. It is impossible to measure change for these students, even if it is perceived to have taken place. Many of the items with the highest percentage of top freshman ratings ("Highest 10%") are among those with the lowest correlations between freshman and senior ratings. Therefore, there are both restriction of range and regression effects operating here, which decreases the magnitude of the results, especially the correlations. Nevertheless, most variables showed significant, replicable gains from the freshman to senior year. Those items where no significant gains were observed were not among those exhibiting the ceiling effect, with the exception of *"impulsiveness."*

Career-oriented Versus Liberal Arts Programs

The increased sample size resulting from the combination of the two years of data produced a more stable breakdown by type of academic program. There were 163 students enrolled in the career-oriented programs and 95 in the traditional liberal arts majors. The results obtained for the two groups are shown in Table 4, and are summarized below:

Table 4. Longitudinal Study - Comparison of Liberal Arts & Professional Studies- Combined 1976-80, 1977-81 Sample.

Variable		Liberal Arts (N=95) t	FR Mean	SR Mean	Mean Diff.
Ability to see Relationships		6.05	3.38	3.87	.495
Academic Ability		5.93	3.53	3.95	.415
Understanding Science		5.53	3.10	3.55	.452
Mechanical Ability		5.45	2.52	2.97	.453
Reasoning Ability		5.19	3.38	3.77	.398
Writing Ability		4.12	3.19	3.54	.351
Social Development		4.05	3.39	3.71	.323
Drive to Succeed		3.88	3.63	3.94	.301
Personal Development		3.87	3.60	3.88	.280
Artistic Ability		3.73	2.76	3.05	.298
Ability to Handle Stress		3.72	3.50	3.81	.305
Self-confidence (intellectual)		3.72	3.38	3.69	.309
Personal Organization		3.67	3.43	3.77	.337
Leadership Ability		3.66	3.27	3.59	.323
Aesthetic Sensitivity		3.61	3.40	3.76	.366
Tolerance of Others		3.36	3.68	4.00	.315
Awareness of Philosophies		3.27	3.30	3.61	.312
Independence		3.23	3.65	3.94	.290
Critical Thinking		3.21	3.26	3.54	.280
Development of Friendships		3.04	3.67	3.92	.258
Persistence		2.98	3.44	3.72	.287
Public Speaking Ability		2.94	2.78	3.06	.284
Self-confidence (Social)		2.90	3.11	3.37	.258
Vocabulary, Facts		2.70	3.29	3.50	.207
Originality		2.19	3.40	3.60	.192
Quantitative Thinking	NS	1.74	3.00	3.18	.183
Optimism	NS	1.60	3.53	3.68	.149
Popularity	NS	1.53	3.23	3.36	.128
Impulsiveness	NS	1.39	3.36	3.21	-.147
Reading Ability	NS	1.12	3.53	3.63	.096
Athletic Ability	NS	1.11	3.51	3.81	.084
Math Ability	NS	.82	3.16	3.23	.065
Literary Acquaintance	NS	.58	3.15	3.21	.054
Appreciation of Religion	NS	.55	3.37	3.43	.065

NS = Difference in means is not significantly different ($p < .05$)

Variable		Professional Studies (N=163) t	FR Mean	SR Mean	Mean Diff.
Social Development		7.99	3.42	3.92	.506
Self-confidence (Social)		7.93	3.11	3.62	.509
Personal Development		7.84	3.50	3.91	.411
Leadership Ability		7.54	3.27	3.78	.519
Ability to Handle Stress		7.33	3.38	3.90	.519
Reasoning Ability		7.20	3.30	3.73	.431
Public Speaking Ability		6.84	2.66	3.16	.500
Critical Thinking		6.20	3.22	3.62	.395
Tolerance of Others		6.15	3.56	3.99	.431
Independence		5.96	3.53	3.93	.398
Ability to See Relationships		5.88	3.38	3.75	.375
Personal Organization		5.46	3.60	3.98	.379
Understanding Science		5.42	2.94	3.29	.352
Self-confidence (Intellectual)		4.96	3.28	3.61	.335
Originality		4.88	3.22	3.53	.311
Persistence		4.44	3.54	3.83	.288
Artistic Ability		4.40	2.52	2.84	.317
Mechanical Ability		4.39	2.56	2.86	.304
Awareness of Philosophies		4.35	3.26	3.53	.272
Optimism		4.34	3.43	3.73	.298
Vocabulary, Facts		3.63	3.11	3.31	.206
Popularity		3.62	3.28	3.47	.191
Appreciation of Religion		3.03	3.39	3.60	.208
Academic Ability		3.00	3.61	3.78	.167
Writing Ability		2.88	3.16	3.31	.157
Drive to Succeed		2.63	3.80	3.97	.172
Reading Ability		2.33	3.53	3.67	.138
Development of Friendships		2.11	3.84	3.99	.146
Athletic Ability	NS	1.68	3.20	3.29	-.094
Impulsiveness	NS	1.21	3.22	3.13	.087
Quantitative Thinking	NS	1.11	2.88	2.96	.075
Aesthetic Sensitivity	NS	1.02	3.38	3.45	.075
Literary Acquaintance	NS	.88	3.04	3.11	.063
Math Ability	NS	.00	3.28	3.28	.000

Table 5. Items with Significant Gain for Both Liberal Arts and Career-oriented Majors that Replicated in Both Years.

Liberal Arts	Career-oriented
Ability to See Relationships	Social Development
Understanding Science	Personal Development
Mechanical Ability	Leadership Ability
Reasoning Ability	Ability to Handle Stress
Social Development	Reasoning Ability
Personal Development	Ability to See Relationships
Artistic Ability	Understanding Science
Ability to Handle Stress	Artistic Ability
Leadership Ability	Mechanical Ability

1) Both groups showed significant gains on 24 items. Of these, nine items replicated, when looking at the two years separately. Table 5 shows those items, ordered by t-value.
2) No significant gain was observed in either group on five items *(athletic ability, impulsiveness, quantitative thinking, literary acquaintance, and math ability)*.
3) One item *(aesthetic sensitivity)* showed a significant gain for liberal arts majors only. Four items *(optimism, popularity, appreciation of religion, and reading ability)* showed significant gains for professional majors only.

There are four possible conditions for gain, when comparing the two groups. The groups could have either freshman or senior ratings that are the same or different.

1) Only one item *(vocabulary, facts, etc. in various fields)* was rated significantly* different by freshmen in the two groups; i.e., higher by liberal arts majors.
2) Nine items were rated significantly* different by seniors:

Higher by Liberal Arts	Higher by Career-oriented
Academic ability	*Self-confidence (social)*
Understanding science	*Social development*
Aesthetic sensitivity	*Personal organization*
Writing ability	
Quantitative thinking	
Vocabulary, facts...	

3) In the majority (21) of the cases, the items showing significant gain were not rated differently by either freshmen or seniors majoring in the two program groups.

SUMMARY AND DISCUSSION

The longitudinal study of two cohorts of graduating seniors who entered as freshmen four years earlier indicated that there was positive change in the self-perceptions of these students on 30 traits and characteristics. These gains were consistent with other evaluations of the college experience, particularly the impact of courses in and out of the major.

The comparison of liberal arts and career-oriented majors showed that the students change, and that they were more alike than they were different.

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* $p < .05$ using a two-tailed, t-test.

As freshmen, they differed on only one of the 34 traits and abilities; however, as seniors they were different on nine. The differences are consistent with the type of program, and reflect the objectives of those programs. The career-oriented programs consisted primarily of education majors, and were predominantly female. Students in these career-oriented disciplines experienced the greatest gain in: *social development, self-confidence (social), and personal development.* For students in the liberal arts programs, the *ability to see relationships, academic ability, and understanding science* were the traits with most significant gains. Contrary to results of Endo and Harpel (1980), students in the professional programs showed a greater gain in interactive skills rather than a narrowing of abilities, while liberal arts majors made greater gains in cognitive skills.

The gains appear more credible when viewed in concert with other research results:

1) Alumni reports of the importance to job success; and, more particularly, the impact of the college on these same traits parallel the longitudinal results of this study (Green and Morlock, 1980). The alumni surveyed were primarily graduates of professional programs and reflect the same emphasis on social and personal development and communication skills as observed by the seniors in corresponding programs. The majority of these alumni and seniors were education majors and are probably reporting the effects of improved public speaking ability, social interaction, and personal growth emphasized in that curriculum.
2) Correlations between senior ratings of traits and abilities and senior evaluations of the impact of the college of these same characteristics were positive. The senior evaluations did not correlate highly with their freshman ratings, however. This suggests that the higher ratings of the traits may be due to the college experience.
3) Departmental Profiles, based on all the items from the Senior Survey, revealed distinct differences among majors in the amount of perceived progress, and the impact of courses, both in and outside the major (Green and Morlock, 1979).

The preliminary results of this longitudinal study leave many technical problems unsolved. In particular, the issue of measuring change from two fallible measures (Lord, 1963) has not been adequately addressed. Further studies will also involve the use of factor analytic and other multivariate statistical techniques.

BIBLIOGRAPHY

Astin, A. W. Four Critical Years, San Francisco: Jossey-Bass, 1977.

Endo, J. J. and Harpel, R. L., A Longitudinal Study of Student Outcomes. Paper presented at the 1980 Annual Meeting of the Association for Institutional Research, Atlanta, Georgia, April 1980.

Feldman, K. and Newcomb, T. The Impact of College on Students. San Francisco. Jossey-Bass, 1969.

Green, D. M. and Morlock, J. V. The Departmental Profile--A better value-added index. Paper presented at the 1979 Annual Meeting of the North East Association for Institutional Research, Cooperstown, New York, 1979.

Green, D. M. and Morlock, J. V. Back to Basics, What the Alumni Say. Paper presented at the 1980 Annual Meeting of the North East Association, Amherst, Massachusetts, 1980.

Lord, F. M. Elementary Models for Measuring Change. In (C. W. Harris, Ed.), Problems in Measuring Change. Madison, Wisconsin: University of Wisconsin Press, Pp. 21-38. 1963.

Pace, C. Higher Education Measurement and Evaluation Kit. Los Angeles: Center for the Study and Evaluation, Graduate School of Education, University of California, 1971.

CAREER MATURITY, LOCUS OF CONTROL, AND JOB-SEEKING BEHAVIOR IN THE INITIAL EMPLOYMENT OF COLLEGE GRADUATES

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Major theories of career development (Crites, 1969; Super, 1957) have postulated a developmental construct of career or vocational maturity and have tended to assume that a vocationally mature adolescent who had made a realistic and appropriate occupational choice would make a relatively smooth transition from education to work. Thus career education and guidance and the assessment of career maturity have focused on students while in school, and there has been little research on the actual transition from school to work, particularly at the college and university level. There is now widespread recognition of the need to study the transitional process and concern that current economic realities have made this transition more difficult (Crites, 1976; Girzberg, 1972; Sarason, Sarason and Cowden, 1975).

In considering the transition to employment and successful adjustment to the world of work, it has been suggested that the construct of locus of control, drawn from Rotter's social learning theory (1966) may be particularly relevant and that there is a relationship between career maturity and locus of control (Gardner, in press). Locus of control refers to the degree to which an individual accepts responsibility for the outcomes of his or her own behavior; an individual with an internal locus of control believes that what happens to him is directly contingent on his own behavior or characteristics, while an individual with an external locus of control tends to believe that outcomes are dependent on luck, chance, or powerful others. Given present economic conditions and a tight job market, locus of control may be related to the degree of preparation and effort individuals devote to job-seeking in the transition from school to the world of work. Stevens has observed that "job-seeking behavior is the bridge linking job choice to the desired job" (1973, p. 219). It seems logical therefore that career maturity and/or locus of control could be related to the job-seeking behavior and could be determinants of success in the transition from college to work.

This study was designed to empirically explore the transition from college to professional employment, by drawing on the developmental construct of career maturity and the generalized construct of locus of control as possible determinants of initial employment of college graduates. In addition to these psychological variables, other relevant factors such as academic achievement and work experience were considered. In the context of the career development stages postulated by Crites (1969, 1976), this marks the transition from the Exploratory stage to the early Establishment stage, and thus the transition to adulthood.

METHOD

Subjects

The sample for this study consisted of 120 graduating seniors in three career-specific degree programs (management, nursing, and education) at a major state university. The sample was limited to full-time undergraduates who intended to seek full-time professional employment following graduation. Each degree program included males and females.

Variables

Career maturity was measured by Crites' Career Maturity Inventory, Attitude Scale (1978). Locus of control was measured by the Different Situations Inventory (Gardner and Warren, 1978). Academic achievement was measured by final grade point average, based on a 4.0 scale, obtained from college records following graduation.

To determine whether the psychological variables of career maturity and locus of control were related to behavior, two behavioral variables, work experience during college and use of the university placement service, were included. The extent of work experience during college could shape career maturity and/or locus of control and be related to success in obtaining employment after graduation. Work experience during the college years was assessed by a researcher-designed index of work experience, which included employment during the school year and summer employment. A college or university placement service is available at most institutions and represents a job-seeking resource that is easily available. Based on previous research, Dewey (in press) suggested that students wtih a high level of career maturity and/or a more internal locus of control could be more motivated to utilize available resources during the job-seeking process.

Procedure

With the assistance of faculty in each degree program, the researcher met graduating seniors two to four weeks prior to graduation. Subjects were asked to sign a consent form for access to academic records and to complete a personal data questionnaire. Subjects then completed the Career Maturity Inventory (CMI) and the Different Situations Inventory (DSI).

Six months after graduation, an employment questionnaire was sent to all subjects. The questionnaire requested data on job-seeking techniques, including the use of the university placement service, and present employment status. Complete data was obtained for 120 graduates.

Based on the results of the employment survey six months after graduation, a second follow-up designed to obtain more detailed data on job seeking behavior, was conducted in conjunction with an alumni placement survey routinely undertaken one year after graduation.

RESULTS AND DISCUSSION

Discriminant analysis of employment status

The primary objective was to determine to what extent the selected variables could differentiate between graduates who were successful in obtaining full-time professional employment in their major fields and those who were unable to find appropriate employment. The final outcome, or dependent variable, was employment status six months after graduation. Employment status consisted of two categories: graduates with full-time professional employment in major field (N=87) vs. graduates not employed as trained (N=33). While the group "not employed as trained" includes several variations such as other full-time employment, part-time employment, and unemployment, all of these subjects essentially have been unsuccessful in obtaining full-time professional employment in their major fields.

TABLE 1

Summary Table of Stepwise Discriminant Analysis: Employment Status as Dependent Variable

Step	Variable entered	Wilks' lambda	Standardized discriminant function coefficient
1	Use of Placement file	.92213	-.66858
2	Sex	.90814	.71153
3	Major	.89131	.38183
4	GPA	.87782	-.34092
5	CMI	.85535	-.27164
6	DSI	.85098	-.19405

Group centroids (group means):

Group I	(Graduates employed in major field) (N=87)	-.25558
Group II	(Graduates not employed in major field (N=33)	.67379

Stepwise discriminant analysis was utilized as a statistical technique since the purpose is to determine whether and to what extent the independent variables can be used to discriminate between different categories of a nominal dependent variable (Kleinbaum and Kupper, 1978, 414-415). Table 1 summarizes the linear discriminant function, based on the six variables selected through stepwise analysis as contributing to a highly significant discrimination between graduates employed in their major fields and those not so employed (Wilks' lambda=.85098; $\chi^2(6)=18.558$, $p<.01$). Table I includes the discriminant function coefficients, which represent the relative contribution of each selected variable to the discriminant function. The group centroids indicate the relative position of the groups along the dimension of the discriminant function (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975, p. 443). The coefficients indicate that use of the university placement file, higher grade point average, higher career maturity and a more internal locus of control contribute to the centroid position (-.25558) of the employed group along the linear discriminant function, while being female and being in education as a professional field (compared to management or nursing) contribute to the centroid position (.67379) of the group not employed as trained. The only variable that did not contribute to the discriminant function was work experience during college. More detailed data and statistical analyses are reported in Hulbert (1981).

Post hoc analyses of job-seeking behavior

Comparison of job-seeking behavior by employment status

Data on the job-seeking process and specific job-seeking techniques was collected through questionnaires six and twelve months after graduation. On the employment questionnaire six months after graduation, subjects were requested to check off all of the job-seeking techniques used, and to indicate the specific technique through which employment had been located (Table 2).

TABLE 2

Summary of Job-Seeking Techniques

	Graduates employed full-time in major field (N=87)		Graduates not employed full-time in major field (N=33)	
Technique	Used this technique	Located job through this technique	Used this technique	Located job through this technique
Placement Service	47	2	8	1
Faculty members	37	10	9	1
Friends/referrals	51	12	18	8
Own contacts	69	42	23	11
Newspaper and other ads	39	13	19	7
Employment agency	16	6	4	3
Other	8	2	2	2
Total	267	87	83	33
Mean number of techniques used during job-seeking process		3.068		2.515

Of the graduates who are employed in their major fields, almost half (42 of 87) report finding their jobs through their own contacts. In contrast, of the graduates who have not been able to locate full-time employment in their major fields, only one-third (11 of 33) report locating their jobs this way. To locate a job through one's own contacts represents the most active of the job-seeking techniques and could be interpreted as a behavioral outcome of a more internal locus of control and/or a higher level of career maturity.

In examining the total number of job-seeking techniques utilized, it was found that the graduates employed in their major fields used an average of more than three techniques. Those not employed in their major fields used an average of two and a half techniques. Thus graduates who are employed as trained apparently conducted a more active or more varied search for employment.

Comparison of job-seeking behavior by degree program

The differences in job-seeking behavior appeared sufficiently pronounced to warrant a second follow-up to obtain more information on certain aspects of the job-seeking process. To request extremely detailed responses (e.g., number of interviews resulting from each job-seeking technique) approximately a year after graduation presented some difficulties, however, and complete data was obtained for only 59 of the 120 subjects. The proportion of respondents by degree program, sex, and employment status approximated the proportion in the original sample.

The data obtained one year after graduation included quantitative data on frequency of use of each job-seeking technique, number of interviews resulting from each technique, and number of job offers, as well as qualitative or descriptive information on steps in the job-seeking process, reasons for rejecting job offers, and interview questions or comments related to possible sex discrimination. In each of the degree programs included in the study, a somewhat different pattern of job-seeking behavior emerged, through a combination of descriptive and quantitative data (Table 3).

TABLE 3

Comparison of Job-Seeking Process by Degree Program

Degree Program	Job-Seeking techniques		Interviews		Job Offers	
	Range	$\bar{x}$	Range	$\bar{x}$	Range	$\bar{x}$
Management(N=15)*	3-5	3.8	3-15	9.1	1-3	1.9
Nursing(N=19)	1-6	2.7	2-10	4.2	1-12	2.5
Education(N=21)	1-6	3.4	1-20	7.7	1-4	1.5

* Does not include 4 who had employment commitments prior to graduation

Management graduates generally conducted the most active job searches, reporting the use of three or more job-seeking techniques. The number of interviews reported was high, but the number of job offers was limited. Half of the management graduates accepted the first or only job offered, and the others reported choosing from among 2-3 offers.

Nursing graduates engaged in a job-seeking process which was less vigorous quantitatively but more effective. Many of the nursing graduates were very selective in initiating contacts with prospective employers. Nursing graduates averaged fewer job-seeking techniques and fewer interviews but more job offers. While half accepted the first or only job offer, the others choose among 2-12 offers.

For education graduates, both nationally and locally, the employment opportunities are severely limited especially in comparison to management and nursing graduates. Of the 21 education graduates who responded to the second follow-up survey, 15 were employed in education and 6 were not. The quantitative data on job-seeking, as reported in Table 3, masks marked variability in individual behavior. It appears that some graduates conducted very active and vigorous job searches (two reported have 20 interviews); of these, some obtained teaching jobs and some did not. Other graduates seemed to limit themselves to a relatively passive job search, with greater reliance on advertisements and employment agencies; each one accepted the first or only job offered.

In comparing job-seeking behavior among graduates of the three degree fields in this study, the amount of "field experience" provided through each program may be an important consideration. In the nursing program, as a function of the required clinical rotation during the last two years, nursing students acquire substantial direct knowledge of various medical institutions, staffing patterns and responsibilities, and views of nurses already employed. In education programs, student teaching is usually limited to one semester in one school, so the experience provided and the resulting contacts are more limited. In the management programs at this university, no field experience is required, so that any direct experience with employment conditions or opportunities would be acquired through summer or part-time employment. Thus the three programs represent a continuum in extent of salient field experience prior to graduation. This may explain why the job-seeking process for nursing graduates appears limited but focused, while the process for the management graduates appears more active but diffuse.

SUMMARY

Crites(1976) feels that there is an urgent need to operationalize and assess the process of transition from school to work. Without an understanding of the process, it is not possible to identify those having difficulty and to facilitate their adjustment. The results of this study suggest that personality variables and job-seeking behavior are among the critical elements in the transitional process and that there are effective ways in which university academic and student services programming can facilitate this process.

Such personality characteristics as career maturity (and the broader construct of psychosocial maturity), locus of control, self-esteem, and achievement motivation are interrelated psychological constructs. In terms of career development theory and social learning theory, the development of the above characteristics can be shaped or modified through appropriate teaching and/or counseling strategies (Gardner, in press). Research on intervention techniques to facilitate career development is summarized in annual reviews of literature in the Journal of Vocational Behavior (e.g., Bartol, 1981). Job-Seeking behavior can be directly influenced through career counseling and placement services, which should begin early in the college years.

In view of the declining percentage of adolescents approaching college age and serious questions about the value of a college degree, research on the career development process during the college years and its outcomes may be essential for institutions of higher education to attract and retain well-qualified students.

REFERENCES

Bartol, L. M. Vocational Behavior and Career Development, 1980: A Review. *Journal of Vocational Behavior*, 1981, 19, 123-162.

Crites, J. O. *Vocational Psychology*. New York: McGraw-Hill, 1969.

Crites, J. O. A Comprehensive Model of Career Development in Early Adulthood. *Journal of Vocational Behavior*, 1976, 9, 105-118.

Crites, J. O. *Theory and Research Handbook for the Career Maturity Inventory*, 2nd ed. Monterey, Calif.: CTB/McGraw-Hill, 1978.

Dewey, B. E., Jr. Factors Affecting Initial Employment in Special Education. ASCUS (in press).

Gardner, D. C., & Warren, S.A. *Different Situations Inventory*, 1978.

Gardner, D.C. Career Maturity and Locus of Control: Important Factors in Career Training. *College Student Journal* (in press)

Ginzberg, E. Toward a Theory of Occupational Choice: A Restatement. *Vocational Guidance Quarterly*, 1972, 20, 169-176.

Hulbert, K. D. The Role of Career Maturity and Locus of Control in the Initial Employment of College Graduates. Unpublished doctoral dissertation, Boston University, 1981.

Kleinbaum, D. G., & Kupper, L. L. *Applied Regression Analysis and Other Multivariate Methods*. North Scituate, Mass.: Duxbury Press, 1978.

Nie, M.H., Hull, C.H., Jenkins, J.G., Steinbrenner, K., & Bent, D.H. SPSS: *Statistical Package for the Social Sciences*, 2nd ed. New York: McGraw-Hill, 1975

Rotter, J. B. Generalized Expectancies for Internal vs. External Control of Reinforcement. *Psychological Monographs*, 1966, 80(1).

Sarason, S. B., Sarason, E. K. & Cowden, P. Aging and the Nature of Work. *American Psychologist*, 1975, 30(5), 584-592.

Stevens, N. D. Job-Seeking Behavior: A Segment of Vocational Development. *Journal of Vocational Behavior*, 1973, 3, 209-219.

Super, D. E. *The Psychology of Careers*. New York: Harper & Row, 1957.

DESIGN AND CONDUCT OF AN ALUMNI SURVEY: A CASE STUDY BALANCING THE DATA NEEDS OF ADMINISTRATORS AND PROGRAM COORDINATORS

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Traditionally, institutional researchers have served the needs of college administrators both in the substance and format of data presented. Studies of entering students, educational costs, faculty load and physical facilities have facilitated administrative external reporting and decision-making. As concern for outcome measures grows within the higher education community, one can assume that this pattern of responsiveness to administrative needs will continue. However, if outcome measures are to impact on institutional operations, it is imperative that appropriate outcome data be available for analysis by program coordinators and program chairpersons.

Lucas (1976) argues with reference to follow-up studies, there is a basic conflict in the type of data necessary for external reporting (administrative need) and that necessary for internal decision-making (program manager need). He believes the "two types of studies cannot be mixed in one outcome effort. Rather the institution must commit itself to the conduct of two different types of outcome studies for two widely different purposes."

The scarcity of resources at many institutions precludes this type of commitment. The Office of Institutional Research at Kean College attempted to develop a program of alumni follow-up that would balance the distinct data needs of administrators and program coordinators. The purpose of this paper is to describe that effort.

The Survey

Kean College of New Jersey is a multipurpose state college enrolling over 13,000 students (8,000 FTE). The college is organized into two schools, School of Arts and Sciences and School of Education, housing 26 academic departments. Kean offers 34 undergraduate major options and 14 master level programs. The college is a wide access institution that serves a diverse student population.

Prior to June 1980 there had been several limited efforts to study Kean alumni. Some academic departments collected data about students who majored in their department. These surveys focused on former students' satisfaction with the program and career related activities. The Career Planning and Placement Office periodically surveyed its registrants to assess the Office's success in job placement. Students in a Sociology Methods of Research course surveyed alumni from the School of Arts and Sciences. The Alumni Office and the Teacher Performance Center also requested data from alumni. While providing some useful information to the units initiating the requests, these fragmented efforts had important drawbacks from an institutional vantage point. There was a needless duplication of effort, students received multiple requests for information, and the groups conducting the studies typically lacked the resources necessary for follow-up and analysis. The institution's need for useful outcome data was reinforced by the Middle States Accreditation Team which visited the college in the Spring of 1980. In June 1980 the Office of Institutional

Research instituted a program to provide institution-wide follow-up data on Kean alumni. From its inception the follow-up program was designed to provide data that would be useful at the institutional level (e.g. reporting to external audiences, marketing decisions) as well as at the program level (e.g. input into curriculum decisions, program review process). At the time the project was instituted the commitment was made to provide for widespread dissemination of findings.

The population being surveyed was the Class of 1979, one year after graduation. A questionnaire was developed with the following objectives in mind:

> to provide a partial base upon which to measure the attainment of the college's mission and goals;
>
> to determine the occupational career development of former students;
>
> to determine the continuing educational development of former students; and
>
> to assess the level of satisfaction of former students with the education and services provided them by the College.

In keeping with the commitment to serve the needs of program coordinators, academic departments were invited to append program-specific questionnaires for inclusion to graduates who majored in identified programs. This process was facilitated by the College Computer Center which generated address labels for all graduates of the Class of 1979 by program codes in social security number. The program code identifier expedited the inclusion of departmental questionnaires and social security numbers were used in the follow-up process. Several departments in the School of Education opted to include questionnaires; however, the questionnaires they appended were designed to provide data for external accreditation rather than internal decision-making.

In June 1981 questionnaires were mailed to the 1883 degree recipients of the Class of 1979. Fifty-four (3%) were returned as non-deliverable; six hundred eighty-three responses (36%) were received from the first mailing. Follow-up questionnaires were sent to the non-respondents several weeks later, which brought the response rate to 54% (1009 useable questionnaires were received from 271 graduates and 738 undergraduates).

The data was first analyzed on an institution-wide basis. A report describing the findings and a one page Executive Summary were distributed to college administrators. As is typical with alumni follow-up surveys, the results were generally positive (Pace, 1979) and administrators who received these data were pleased. The data were used in presentations to the Board of Trustees and other significant groups and proved useful in enhancing the image of the college. The president quoted findings from the survey in his opening address to the faculty in September 1981.

While the public relations value of the effort was a consideration in the development of the follow-up survey, the program was designed primarily to provide information that would impact on the operations of the college. With this in mind, a secondary analysis of the data using program codes as a sorting variable was undertaken. Detailed Program Profiles for all programs with ten or more alumni respondents were developed and distributed to the appropriate deans and program coordinators. Each Profile provided descriptive and attitudinal data from alumni who majored in the specific program, along with college-wide norms for the items. (The supplemental program-specific questionnaires were coded and printouts were forwarded to the appropriate coordinators for analysis.)

This was the first follow-up data on alumni that were disseminated to program coordinators by the Office of Institutional Research. Several program coordinators indicated their appreciation for the data, however, in general, they did not specify how or if it was useful to them. One coordinator did forward an article he had written for the department newsletter which was based on data from the survey.

The Interviews

In order to evaluate the efficacy of the follow-up endeavor, a graduate assistant* assigned to the Office of Institutional Research conducted a series of structured interviews with Program coordinators who had received Profiles of their alumni. A structured open-ended interview schedule about the follow-up survey was designed. It focused on the clarity of the information presented; the value of studying alumni; the usefulness of the data in planning, advisement and decision-making; and the methodology to be used in follow-up studies.

Thirty Program Profiles had been developed from the alumni data. Twenty-four faculty members coordinated these programs and 19 (79%) were interviewed. The interview process proved to be a key element in the follow-up program. In addition to providing for an exchange of information, it established a direct link between the Office of Institutional Research and the program coordinators. The interviews indicated that most of the coordinators (79%) remembered receiving the Profiles. If the coordinator did not have the data, a duplicate Profile was sent and he was interviewed after he reviewed the data. In general, the coordinators found the presentation clear (89%) and the data interesting (79%). A difference between the two schools with reference to the usefulness of the data emerged. All the coordinators in the School of Education said the material was useful. In the School of

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*The authors are indebted to Ms. Marilyn Flood for interviewing the coordinators.

Arts and Sciences, coordinators indicated they believed it was "potentially useful". The difference probably reflects the greater familiarity School of Education faculty have with data of this nature, as well as their need to comply with requests for outcome data from accrediting bodies. When probed about the specific utility of outcome data of this type, the majority of the coordinators referred to image building with significant groups and linkages with employers for student placement. Only two coordinators believed the data could play a role in program adaptation and curriculum revision.

During the interview process it became evident that coordinators were focusing only on the data relating to the vocational development of their graduates. The coordinators' requests for additional data, secondary analyses, and specific data dealt solely with this issue. Topics such as general knowledge, evaluation of faculty and program, and personal growth and development were virtually ignored, as the vocational aspect was emphasized. This was true even in the case of a department with declining enrollments whose coordinator indicated his department provided no vocational training or job counseling and, therefore, would have no use for follow-up surveys.

At Kean, program coordinators have associated alumni follow-up studies with career development. The economic situation, the nature of the Kean student body which is typically first generation college-going, and the development of new vocationally oriented programs help to explain this emphasis on careers.

In addition to sharing information, the interviews provided an opportunity for a representative of the Office of Institutional Research to meet the program coordinators and discuss the entire project. Prior to this meeting, communication between the Institutional Research staff and the coordinators had been mediated through the official channels of the college hierarchy. This had resulted in a gap in communication. Coordinators were not aware of the options they had in appending program-specific questionnaires or of the services the Office could provide with data organization and analyses. Furthermore, while they felt the information was generally interesting and useful with few exceptions (i.e. job placement), they failed to see the potential it provided.

Implications

The need for direct communication with program faculty is crucial if an Office of Institutional Research is going to address the data needs of this group. Based on these findings, the Office is planning to conduct a workshop with program coordinators when the analysis of the Alumni Survey of the Class of 1980 is completed. This workshop will build on the personal contact initiated in the interview process, and will focus on the use and interpretation of data, articulating data needs, and opportunities for secondary analysis.

The question of whether or not the same follow-up effort can serve the needs of administrators and coordinators is still unresolved. What has become apparent at Kean, is that the task of balancing information needs requires a long term effort that extends well beyond data analysis and dissemination.

References

Lucas, John A., "Conflict in student output studies;national and state vs. local need" in Robert H. Fenske (Ed) Research and Planning for Higher Education. The Association for Institutional Research, 1976.

Pace, Robert C., Measuring outcomes of college, San Francisco:Jossey-Bass, 1976.

THE PLACE OF COMPUTERIZED MODELS IN THE INSTITUTIONAL PLANNING PROCESS

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Tufts University, Medford, Massachusetts

When Claire Hanley at Rochester asked me to try to summarize the discussion on "Modelling in the Planning Process", I said that I'd be delighted to try. The title is impressive; it's fun to hear oneself talk; and it's always interesting to see if the other speakers say the same things at the podium that they do in their early outlines.

I want to try to present a framework for the institutional planning process within which the various models discussed this afternoon can be viewed. Chart 1 -- Some Dimensions of Institutional Planning -- is an attempt to show the relationships between the various aspects of institutional life which planning must consider. An institution starts the planning process with a number of "givens": a student body with a particular composition and set of interests; a faculty at a given pay level and with a certain set of specialties; physical facilities in some state of repair; finances in a precarious or a safe state, and so forth. Out of these considerations, and in light of external changes pressing on the institution (e.g., changes in market demand for particular programs; mandates from a state coordinating board, etc.), certain changes in the institution's academic programs are formulated. Operating budgets are evolved, based on these desired academic program changes and

CHART 1: SOME DIMENSIONS OF INSTITUTIONAL PLANNING

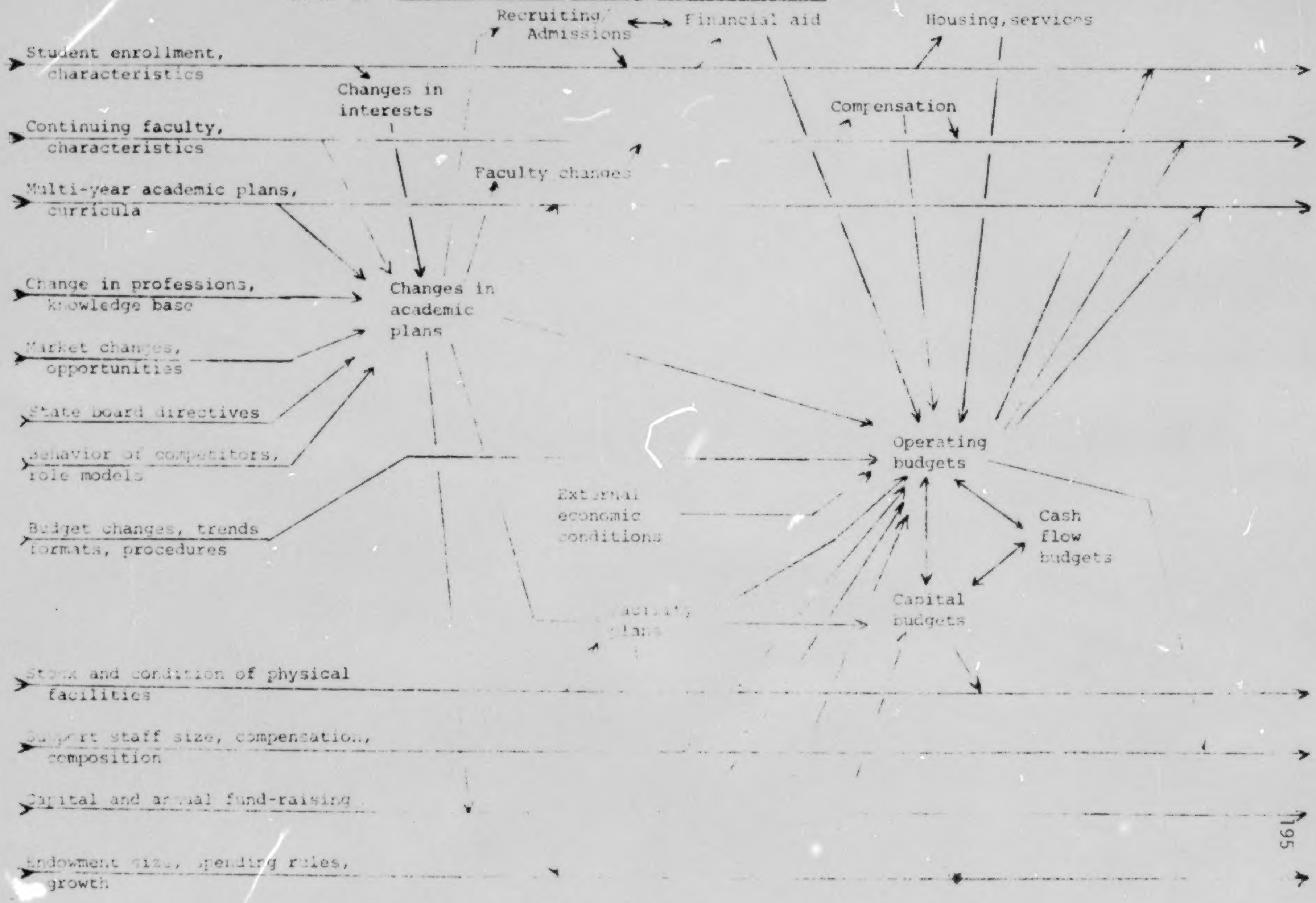
Recruiting/ Admissions
Financial aid
Housing, services
Student enrollment, characteristics
Changes in interests
Compensation
Continuing faculty, characteristics
Faculty changes
Multi-year academic plans, curricula
Change in professions, knowledge base
Changes in academic plans
Market changes, opportunities
State board directives
Behavior of competitors, role models
Operating budgets
Budget changes, trends formats, procedures
External economic conditions
Cash flow budgets
Capital budgets
Facility plans
Stock and condition of physical facilities
Support staff size, compensation, composition
Capital and annual fund-raising
Endowment size, spending rules, growth

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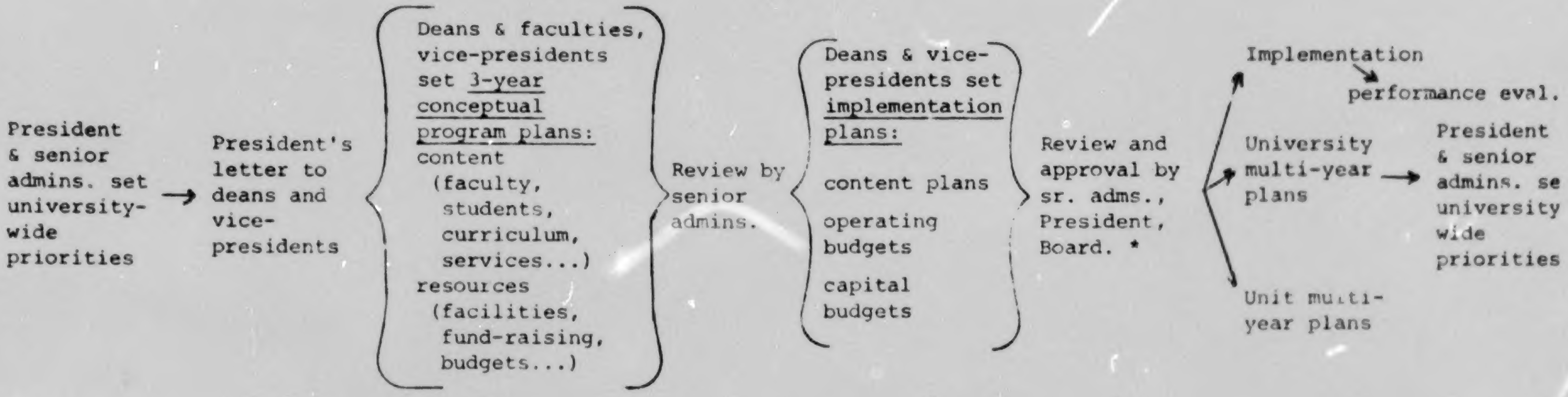
CHART 2: A PLANNING CYCLE



President & senior admins. set university-wide priorities →

President's letter to deans and vice-presidents

Deans & faculties, vice-presidents set 3-year conceptual program plans:
content
(faculty, students, curriculum, services...)
resources
(facilities, fund-raising, budgets...)

Review by senior admins.

Deans & vice-presidents set implementation plans:
content plans
operating budgets
capital budgets

Review and approval by sr. adms., President, Board. *

Implementation → performance eval.

University multi-year plans → President & senior admins. se university wide priorities

Unit multi-year plans

Exploratory models of alternatives

Narrative, plus models showing general feasibility; exploratory models on critical aspects

Detailed plans for 1 year, updated models for projections.

*Approval only for 1st year; but approval given only in context of 3-year (or longer) program and budget directions.

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on other considerations. Fund-raising and endowment performance will, together with the operating budget, determine any capital expenditures to be made. Plans will be affected by cash flow feasibility. And so on. My first point is simply that computer modelling can be used in the representation of almost all of these considerations. To model changes in the knowledge base of a discipline or some kinds of market changes may not be possible; most other dimensions can be (and in many institutions are being) modelled.

Chart 2 is a schematic outline of a planning cycle, in this case that of a multi-school institution on an annual three-year program. The president and the senior officers set institution-wide priorities, based on their vision of the needs of the institution and their integration of the multi-year plans of the constituent units. Each school, college, or operating unit then develops conceptual three-year program plans, with the responsible dean or vice-president involving faculty and/or staff members in appropriate ways. For each area, such considerations as program content, resources needed, facility and funding implications and the like are described. Models for specific elements (e.g. student housing, ways of borrowing needed capital) may be used to help think through alternatives. A multi-year budget model is used to summarize all these considerations. The model is not intended to carry all the detail needed for final budget approval; instead, it is a tool used by each administrator to test and demonstrate the overall feasibility of his plans. Once these conceptual plans are approved, each unit develops detailed implementation plans. Here the general model may or may not be used in the detailed budget preparation, depending on the size and complexity of the unit. The model will be used, however, to project second-year and third-year results after the detailed budgets are developed. Again, the point is simple: models can effectively be used at several stages of the integrated planning/budgeting process.

The papers already discussed illustrate very clearly a variety of sorts of modelling applications.

- Mr. Spiro's enrollment projection model deals with an easily definable dimension of the planning process, and is used at the implementation stage of the planning/budgeting cycle. The problem can be clearly laid out; good data can be collected; the model has been built for rapid generation of usable information. By being specific in its assumptions and its logic, it facilitates rapid correction and easy understanding.

- Ms. Rocha's facilities and maintenance model is an example of a situation where attempting to build a model forces everyone involved to think through the problem they are trying to solve. Here the interest is long-term rather than immediate, and in orders of magnitude rather than precise quantities; the problem is ill-understood rather than obvious. But the modelling attempt is equally useful.

- Mr. Heck's operating budget model is yet a third type. Both the enrollment model and the maintenance one deal with specific aspects an institution's activity; the budget model shows the usefulness of bringing together into budget form all of the variables with which an institution has to deal — or at least all of them which immediately impact on the budget. Here the model helps the planner to look at tradeoffs and interactions between variables.

I don't have to sell any of you on the possible benefits of computer modelling. If you weren't interested, you wouldn't be here this afternoon. There are, however, some limitations to the use of computerized models you should keep in mind:

- they are useful to the degree that the institution is self-determining in the area modelled. If the planner can have no significant input to or impact on the decision, then modelling may be intellectually interesting but may also be a waste of time. It is of little help to a planner in a state college to model the impact of a different tuition level when tuition levels are set by a state agency without consultation.

- models are inevitably quantitative. This means that some "feel" is necessarily omitted from the analysis of many areas, and there are some areas which just cannot be modelled usefully (e.g., changes in the nature and content of a profession; the quality of a program, which may argue for its retention or support despite unusual costs; political considerations which may militate for retention or development of one program over another.) The mood of the campus cannot be considered. The need for changes in departmental/divisional structure; priorities among facility projects; priorities among fields in which to place additional faculty; the way fund-raising appeals are pitched -- all of these are examples of things non-quantitative, but clearly related to institutional planning.

- the model (in any area) is a model, not a plan. It is the result of a plan; or a way of expressing the results of a plan; or one of several alternative plans -- but it is not in itself a plan. The model doesn't tell you what to do. It can show you some effects of some choices; it can help force you and others to make the thinking process explicit; it can take multiple variables into account simmultaneously and derive logical but not easily foreseen results. But it isn't a plan. A plan is what some individual or group adopts as a guide to action. It may be written or simply understood. The model can mimic ideas, model them; it cannot generate them.

- a model cannot easily take into account the difference between plans, strategies, tactics, implementation steps. Ideally, institutional planning involves the development of courses of action, their reduction to action, and some feedback into performance evaluation on the one hand and further planning on the other.

- models tend to deal with in-house comparisons and data. But a great deal of planning involves what the competition is doing, what external forces are pressing, etc. We set tuitions in part out of plans and models, in part with an eye on competitive institutions and on indices of ability to pay. We set compensation for faculty and non-faculty on the basis of other institutions' policies and of prevailing local practice, not always because something fits our budget model. Financial aid policy decisions often depend on competition and on changes in federal or state policies, not so much on our own preferences or pieties. Endowment performances are measured against outside market indicators and are affected by external conditions. And so forth.

- Ironically, models are fun, and that can be a problem. It's a damn sight more interesting to develop a classy sophisticated model than it is to convince the decision-maker why he should use it. We are all too easily tempted to play at the terminal and forget the politics of planning. A model which is a secret between you and the computer memory isn't much help.

In summary, then, the place of computerized models in institutional planning is pervasive, in that they can be used in almost any dimension or at at any stage of the planning enterprise. But they are limited in their ability to model some issues; they tend to focus us in-house; and finally, they may divert us from the politics of the planning process by their charm and tempt us to forget that they are not plans at all.

THE ROLE AND SCOPE OF INSTITUTIONAL RESEARCH IN STATE UNIVERSITY PLANNING AND BUDGETING

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Background

During the days of growth and comparative affluence under the Rockefeller administration in the 1950s and 60s, planning by the State University of New York (SUNY) was geared toward developing and implementing a comprehensive system of public higher education for the residents of New York State. Funding was primarily enrollment driven and, with enrollments growing, there was little worry about routinely and systematically linking academic and mission plans to the annual budgeting process in a comprehensive, detailed fashion. Times have changed, however, and so must planning and budgeting. What was responsive and appropriate a decade ago is no longer adequate.

Today, like other components of higher education, SUNY is faced with declining percentages of State tax resources and projections for stabilized enrollments. This can be no more dramatically evident than in the State of New York Executive Budget, one of the most important references to the proposed financing for New York State agencies. Submitted by Governor Carey to the New York Legislature on January 19, 1981, this document was said to have been constructed so as to reinforce the Governor's commitment to the discipline of financial austerity. It recommended that less be spent on general government and more on direct human services, including eventual full State takeover of Medicaid costs. Disagreement over the proposed budget was so severe that no budget for New York State for the period April 1, 1981 through March 31, 1982 was passed into law until early May 1981.

The intent of the Executive Office for higher education was clear as can be seen by the "Message of the Governor" section of the budget:

> "My recommendations for the State University . . . reflect both the need for budgetary restraint and the fact that the University has by now stabilized most of its operations . . . we cannot ignore a projected decline in the State's college-bound population that dictates consolidation rather than expansion over the next several years . . ."(1)

The environment of the University and the climate in which it operates thus demands strong, creative, and flexible management.

The Multiphase Rolling Plan (MRP)

The essential concepts of State University's Multiphase Rolling Plan (MRP) were formed, developed and officially presented to Executive Staff, the Board of Trustees, and the University Community during the period August-December 1980. A special presentation was made to the Board of Trustees during their monthly meeting in December on the document, "A Multiphase 'Rolling Plan' for the State University of New York, November 1, 1980". A resolution endorsing the plan was passed by the Trustees and the Chancellor was given authorization to start implementing it.

The "Multiphase Rolling Plan" for the system is a dynamic process made up of several levels of change with different timetables, all of which result in a meshing of planning and budgeting. Not content to merely develop a traditional "Five- year Plan" in response to the call for planning by the Executive Office and the Legislature, SUNY strove to develop a creative, flexible process which would combine overall system and institutional priorities with as much campus flexibility as possible in the policy, managerial, financial, and programmatic areas.

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(1) State of New York Executive Budget for the Fiscal Year April 1, 1981 to March 31, 1982, submitted by Hugh L. Carey, Governor, to the New York State Legislature on January 19, 1981, p. M30.

The role and scope of our office went beyond the implementation of the new process. Policy Analysis-Institutional Research played a key role throughout the various creation, development, and refinement stages of MRP. Developed to ensure the address of academic, fiscal, and political criteria in institutional plans and budgets, MRP is organized along three major dimensions:

1. Intercampus Program Changes - New or existing programs will be strengthened by eliminating or reducing programs with declining enrollments and/or of lesser priority.
2. Intercampus Affiliations and Trades - As a system of public higher education, State University has unique and multiple opportunities for program affiliations and trades. Sharing of resources between or among campuses with the same or complementary programs adds strength and promotes excellence.
3. Campus Mission Changes and System Reconfiguration - The involvement of all constituents is necessary for this complex, difficult, and politically sensitive phase. The goals of SUNY, both as a system and as 64 individual institutions, must be developed and pursued within the fiscal, demographic, and political context of New York State.

The complexity, diversity, and just sheer magnitude of SUNY underscore in an acute fashion the need for a responsive policy, procedural, and evaluative management instrument. We have over 3,700 degree programs and in Fall 1980 enrolled 372,415 students. Preliminary enrollment figures for Fall 1981 show about 380,500 students. The University's planning/budgeting process had to be constructed to effectively deal with and utilize these demographics and their accompanying complexities, challenges and opportunities. Among the critical concepts of the Multiphase Rolling Plan designed to accomplish this are the following:

- a. Meshing planning and budgeting: The Plan = The Budget
- b. Five-year rolling horizon, a dynamic process
- c. System-wide configuration and options
- d. Strengthening the quality of the system
- e. Campus planning essential to system planning.

Many policy issues were raised through MRP. These may be grouped into three categories and may take the form of questions as outlined below:

State Policy Issues

If SUNY's enrollment projections are correct, will access to public higher education be maintained? If SUNY's fiscal projections are correct, can "Share of State funds to higher education and/or SUNY be increased?" If State funding is insufficient for higher education and/or SUNY, what funding level can be expected and how does the State propose to deal with corresponding enrollment reduction?

SUNY Policy Issues

If underfunding continues, should there be selective vs. across-the-board cuts? Quality vs. diversity and scope? Should SUNY's primary planning goal be to meet funding shortfalls? To increase fiscal and program efficiencies? To strengthen the quality of the System? How should planning priorities be determined: at campuses? system-wide?

SUNY and State Policy Issues

How great a State University system does the State of New York want? How great a State University system is the State willing to have?

While all 64 institutions already fall under the perview of the policy and intent of MRP, at the present time just the 34 State-operated/funded campuses are included in every aspect of MRP's detailed processes. These campuses were given a detailed, comprehensive preliminary budget package which contained historical 1975 and 1980 data and which required from the campuses 1982 budget request information along with projections for 1985. In coupling planning and budgeting, every campus was to include each of the foregoing major dimensions of MRP in its request.

Getting the system and the campuses to the point where planning is comprehensively linked to the actual budget was accomplished through strong executive leadership coupled with a committee network and informal supporting subcommittees. Following are three major committees whose work resulted in revamping the preliminary budget process:

1. Committee on Planning and Budgeting ("Meshing" Committee) - This committee bore major responsibility for developing the processes and procedures necessary to mesh planning with budgeting. The ten members consisted of five presidents, one dean, two vice presidents, the Associate Vice Chancellor for Policy Analysis, and a faculty member.
2. Committee on System Priorities - This committee evolved from the SUNY Council of Presidents and was responsible for developing system-wide policies to resolve conflicting priorities and to ensure a consolidated, comprehensive set of priorities for the University.
3. Central Administration Planning and Budgeting Task Force - This group was comprised of broad representation from Central Staff with major thrust and direction being established by Policy and Analysis, Finance and Business, Capital Facilities, and the Executive Assistant to the Chancellor. Other offices that were heavily involved in various elements of the process included Academic Programs and Planning and the Office of Research and Graduate Studies. In integrating and interpreting the findings and recommendations of the first two committees, this working group designed the actual budget schedules and guidelines distributed to the campuses.

In addition to these three committees, a fourth was established to address issues particular to community colleges with an eye towards eventually developing a process similar to that of the State-operated institutions.

MRP and the 1982-83 Preliminary Budget

In charting the future of the University, Central Administration follows an agenda with the New York State Division of the Budget (DOB) similar in format but not in content to that employed for the past several years. The content of this year's official budget request represents the results and decisions reached through the Multiphase Rolling Plan as applied to the preliminary budget process.

During the period April through May 1981, the Planning and Budgeting Task Force consolidated, integrated, interpreted and applied the recommendations of the other major committees and developed budget schedules, directions, guidelines, and procedures to forward to the campuses to follow in developing their preliminary budget request for fiscal 1982-83. This new Budget and Planning Document is the embodiment of the MRP process. Policy Analysis-Institutional Research played a constant and key role not only in the development of MRP but in the specific application of its concepts to the current budget process.

General Guidelines

Copies of the completed Budget and Planning Document were to be submitted to Finance and Business by the campuses at least five days prior to their scheduled meeting date but in no case later than July 6. Lengthy narrative, supplemental information, etc. submitted by some campuses was contained in separate sections and cross referenced to relevant schedules. Presidents were asked to prepare and submit an agenda at least ten days in advance of their campus hearing which outlined specific topics and program proposals.

The agendum were reviewed by selected senior officers of Central Staff whose knowledge about the campuses or the process would highlight items that should be added to or deleted from the agenda. One key check was to ensure that the agenda listed what appeared to be critical elements as reflected through the President's statement and the other schedules. Also considered was the extent to which the Chancellor's following four objectives for the budget process were addressed:

1. Development of a planning process that includes resource parameters.
2. Campus goals which can be achieved with projected staff, funds, and facilities.
3. Consistency in major program objectives as compared to demands and resources.
4. Campus objectives and priorities as part of system directions, objectives, and priorities.

All agendum were reviewed and finalized by the Vice Chancellors and campuses were notified of any changes at least five days prior to their hearing date.

Unlike past years, most budget discussion sessions with the campuses were just a couple of hours long. This was done in an effort to promote the address of only key items and to avoid unnecessary detail. To underscore the importance of these sessions, every hearing was chaired by either the Chancellor or the Executive Vice Chancellor.

Historical Data for Budget and Planning Documents

The official Budget and Planning Document forwarded to the campuses contained fifteen schedules. While all were important to the process, Policy Analysis-Institutional Research was charged with primary or co-primary analysis for eight schedules:

Schedule I - Agenda.
Schedule III - Campus Planning, Evaluation and Review Processes.
Schedule VI (items 3 & 4) - Summary Information: Enrollment Data and Approved Instructional Programs.
Schedule VIII(b) - 1982-83 Enrollment Plan.
Schedule IX(b,c) - Summary of Academic Administrative Units.
  - FTE Workload and FTE Faculty by Major Academic Administrative Unit.

Schedule X(a,b) - Historical and Projected Trends in Headcount Enrollment and Degrees Granted by Broad Discipline Categories, Fall 1975 Through Fall 1985.
Schedule XI - Faculty and Staff Planning (Full-time Faculty).
Schedule XV - Program Plans (Affiliations, Trades, Additions, Deletions).

All Institutional Research staff became heavily involved in the 1982-83 budget process commencing in May. During that time, our primary tasks fell into the following five categories:

1. Getting major information systems in order for producing individual campus and system-wide reports.
2. Generating reports and listings from major files using SPSS and APL.
3. Establishing processes, procedures, and controls for processing and analyzing completed campus schedules.
4. Preposting historical 1975 and 1980 data.
5. Developing APL programs for processing 1982 and 1985 data.

Commencing with the preliminary budget cycle for fiscal 1982-83, less financial data were requested and much more academic-institutional planning information was required. This was the first time in many years that academic information was included as part of the system-wide budget process insofar as specifying FTE faculty instructional workload, headcount enrollment by major program, etc.

Over the course of the past five years, the management information systems capability of Central Staff has expanded. This expansion has been coupled with an increase in the accuracy and understanding of the systems and a realization of the need to actively utilize these systems in planning and budgeting as well as in simulations, modeling, and projections for University-wide purposes. The application of MRP to the present budget cycle and the utilization of University systems and data helped ensure that there was a consistent, across-campus consideration by top managers of those items and variables necessary for the system as a whole to go forward. We live in an age where University-wide planning requires University-wide systems.

Three major systems were utilized by our office in supporting the preliminary budget process:

1. The Course and Section Analysis (CASA) system contains information on faculty instructional workload.
2. The Student Data File (SDF) is an automated student information file.
3. The Academic Program Information System (APIS) is comprised of four related files. The APIS Enrollment File consists of semester enrollment information and is derived from the Student Data File. The Degree File contains the number and type of degrees awarded plus the sex and ethnicity of the recipients. The APIS Master File contains data concerning the characteristics of each academic program. The fourth component is a twenty-year trend file on enrollments and degrees granted.

In posting the historical 1975 and 1980 data, Institutional Research produced standard reports for completing the schedules. There was a direct relationship between the cells in the schedules and the cells in the reports. Our participation in key management committees resulted in budget information being solicited in a format permitting direct use of information system reports.

Drawing upon user-oriented computer languages, we aggregated enrollment and degrees granted data into broad discipline categories for ease of consideration during the budget process. Reporting the data by discrete academic program categories would have resulted in an overwhelming amount of detail and would have inhibited the process.

Analysis of Budget and Planning Documents

Intensive brainstorming and analysis sessions were held among key satellite groups within Central Administration. Three areas in Central Staff had primary responsibility for the development, distribution, and analysis of the budget and planning schedules. Policy Analysis-Institutional Research was one of these. Key managers from each group met regularly to keep one another informed of the results of their analysis efforts, to coordinate the overall review, and to develop questions and issues that Central Staff would pursue in more detail with the affected campus at the individual budget discussions.

In reviewing the eight schedules for which we had primary responsibility, we looked for internal and external consistency among these forms and between these forms and the other schedules and processes of SUNY. We relied upon support systems and staff to check the accuracy and consistency of the figures supplied in the schedules. Professional staff were charged with identifying major issues, concerns, opportunities, and problems.

The statement of the President was a crucial element in the planning and budgeting document. It enunciated future goals, plans and activities of the campus as they were to be achieved within the resources requested and planned. The extent to which the other schedules supported or possibly deviated from the President's statement was one of the key items reviewed. Throughout all of this, we constantly reminded ourselves of the dynamics of the process and the needs of the system. We asked whether the proposals contained within the individual budget schedules were within the campus mission or whether they will require Master Plan amendment. We needed to estimate whether any of the programs and resource requests were duplicative of and/or in competition with other State University programs (existing or proposed), with the City University and/or with private institutions in New York State. We were constantly on the outlook for references to or possibilities for affiliation or trade. The results of these sessions were summarized in the form of memoranda, schedules and outlines. Consolidated, detailed questions and issues were then developed for presentation to the Vice Chancellors and Chancellor for possible use during campus hearings.

After the last campus budget discussion was held, the coordinating groups met and prepared a consolidated budget request on behalf of the entire University. These materials were then submitted to a University-wide

Presidential Budget Review Committee for their review and recommendations. This was further reviewed by the Vice Chancellors and by the Chancellor. The planning/budgeting process as well as the major elements of the proposed budget request were presented to the University Board of Trustees in September 1981. Based upon their guidance, the 1982-83 request was developed and then approved at the October Board meeting. Their approved request was then submitted to the Division of the Budget and reflected, with slight modification, the material briefed to the Division of the Budget on October 19, 1981.

Our focus has been on major issues required by the system to maintain its vitality and to go forward in strengthening the quality of academic programs, maintain access, and effect cost and program efficiencies. A good start has been made on implementing a responsive, consolidated planning process. Among the next steps to pursue are the following:

1. An evaluation of the Multiphase Rolling Plan process.
2. Follow-up actions on planning and budgeting items.
3. Review of campus planning procedures.
4. A prioritization process for policy and budget reconciliation and for costs and benefits of competing resource needs.
5. Full implementation of recommendations by the Presidential Meshing Committee.

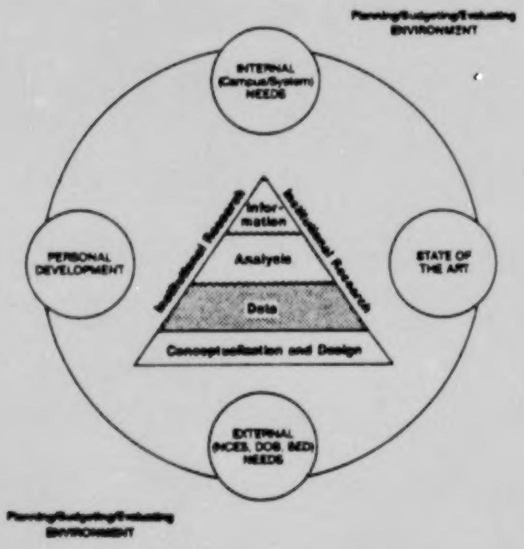
The Role and Scope of Institutional Research

We have been in the mainstream of the current major development and budgeting efforts and feel as though we have been engaged in processes that really represent what Institutional Research is all about. We must be a participator and/or initiator in processes and events that use our data. Simply responding to requests diminishes our effectiveness. A review of the literature points to the following eight conditions and fluid relationships:

1. Institutional Researchers must be a party to the conceptualization and design of studies and processes that utilize data in order to be effective.

2. Institutional Researchers should constantly influence and should be influenced by the environment.
3. Environment propels Institutional Researchers upward in pyramic fashion from conceptualization and design to development of data bases to analysis and generation of information in support of management.
4. In supporting the management function, the Institutional Researcher is satisfying an important internal agency need.
5. Acquisition and application of new analytic techniques, plus the 'rewards' of a job completed and well done, serve to enhance self-esteem and fulfill the drives of personal (personnel) development.
6. Demands of external agencies may serve to promote the development of local information systems, may demand new types of data and analyses, or may raise issues that could alter local-regional operations, the state of the art, and goals for personal development.
7. The foregoing relationships are interdependent and complimentary.
8. Feedback and adaptation are constant.

The Role and Scope of Institutional Research in State University Planning and Budgeting


Planning/Budgeting/Evaluating
ENVIRONMENT
INTERNAL (Campus/System) NEEDS
Information
Analysis
Data
Conceptualization and Design
Institutional Research
Institutional Research
PERSONAL DEVELOPMENT
STATE OF THE ART
EXTERNAL (NCES, DOB, SED) NEEDS
Planning/Budgeting/Evaluating
ENVIRONMENT

The Central Administration of the State University of New York is an exciting environment for Institutional Research. We are glad to be part of that environment.

REFERENCES

Broad, Molly Corbett. "Federal Reporting Requirements: Institutional Burdens for Higher Education". Symposium on Government Regulations and Reporting Requirements. Papers from the Fourth Annual Conference on the Northeast Association for Institutional Research. Durham, New Hampshire: October 1977.

"Budget and Planning" (Guidelines for Planning/Budgeting Schedules, Pages 1-25, with Attachments). State University of New York, June 1981.

Budget and Planning Schedules and Documents for Fiscal 1982-83 (34 State-operated/funded Institutions). State University of New York. Summer 1981.

"The Budget: University Faces 'Painful and Difficult Choices'". The News. State University of New York. Volume 10, Number 1. January 1981.

Central Staff Office of Institutional Research and Analytical Studies. State University of New York.

Table 80/820	Employees of Institutions Under the Program of the State University of New York, Fall 1979.
Table 81/1021	Comparison of Preliminary (Sept. 28) Fall 1981 Headcount Enrollment with Budget Goals and Previous Year: Comparison by Level of Student and Full-time Undergraduates by Higher Education History, by Type of Institution, State-operated/funded Institutions of the State University of New York.
Table 81/1024	Comparison of Preliminary (Sept. 28) Fall 1981 Headcount Enrollment with the Previous Year: Comparison of Headcount Enrollment and Full-time Undergraduates by Higher Education History, Community Colleges Under the Program of the State University of New York.
Table 81/994	Official 1980-81 Annual Average F.T.E. Workload and Constituent Credit Hours Produced by Academic Term, Community Colleges Under the Program of the State University of New York.
Table 81/275	Official Credit Course Enrollment, Undergraduate, First Professional and Other Graduates, State University of New York, Fall 1980.
Table 81/316	Student Credit Hours and Full-time Equivalent Workload by Level of Instruction, State-operated/funded Institutions of the State University of New York, Fall 1980.

Charlton, Harry, E. "State Leaders Agree on Budget; SUNY Operations at $994 Million." The News. Volume 10, Number 5. May-June 1981, page 1.

Constitution, Northeast Association for Institutional Research. Amherst, Massachusetts: October 1978.

Directory: 1980-81. The Association for Institutional Research. Tallahassee, Florida: 1980.

Freeman, Thomas M. "The Meshing of Planning and Budgeting Through an Annual Evaluation and Report Process (Concepts for Review)." State University of New York. October 15, 1980.

A Multiphase "Rolling Plan" for the State University of New York, November 1980.

"Planning/Budgeting Analysis Form." (Includes Instructions and Sample Agenda) State University of New York. June 1981.

Saupe, Joe L. The Function of Institutional Research. The Association for Institutional Research. Tallahassee, Florida: 1981.

Saupe, Joe L. Memo to a Newcomer to the Field of Institutional Research. The Association for Institutional Research. July 1967.

"SUNY 'Rolling Plan' Initiated". The News. State University of New York. Volume 10, Number 1. January 1981.

Spindler, Harry K. "Schedule of Planning/Budget Hearings." Memorandum to Executive Staff of Central Administration. State University of New York. June 1, 1981.

State of New York Executive Budget for the Fiscal Year April 1, 1981 to March 31, 1982. Submitted by Hugh L. Carey, Governor, to the New York State Legislature on January 19, 1981.

Tetlow, William L. Institutional Research: The Emergence of a Staff Function in Higher Education. Doctoral dissertation submitted to Cornell University. August 1973.

Torrence, Lois C. "The Institutional Viewpoint." Symposium on Government Regulations and Reporting Requirements. Papers from the Fourth Annual Conference of the Northeast Association for Institutional Research. Durham, New Hampshire: October 1977.

Wharton, Clifton R. Jr. "Assignment of Responsibilities for Action on Planning/Budgeting Materials." Memorandum to Executive Staff of Central Administration. State University of New York. June 2, 1981.

Wharton, Clifton R. Jr. "Chancellor's Agenda. Outlook: SUNY's 1981-82 Budget". The News. State University of New York. Volume 9. November-December 1980, pages 3, 6.

Wharton, Clifton R. Jr. "Planning and Budgeting for SUNY, 1982-83 Through 1985-86." Memorandum to Presidents. State University of New York. May 18, 1981.

Woll, Peter. Public Policy. Cambridge, Massachusetts. Winthrop Publishers, Inc., 1974.

A CROSS-IMPACT MATRIX APPROACH FOR THE GENERATION OF ACADEMIC PLANNING MODELS

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Academic institutions increasingly are being impacted by events which are for the most part beyond their control. Factors such as the decreasing pool of traditional college-age students, changing societal needs and career interests of students, increasing proprietary educational offerings, decreasing student financial aid from government sources, continuing inflationary costs, changing tax laws which decrease incentives for philanthropic gifts from traditional sources, termination and reductions of government grant and loans for special programs and physical facilities have and will continue to have a negative impact on higher education institutions. To counteract these impacts during the next decade, academic institutions need to initiate serious planning efforts which incorporate elements of strategic planning.

The six basic steps of strategic planning include a description of the current state of the institution, an assessment of the future environment impacting upon the institution over the planning period, a description of the projected institutional future if the institution were to proceed into the future without strategic planning, a description of the desired or strategic institutional future, a delineation of the difference between the projected and desired futures which defines the planning gap, and finally the means of overcoming the planning gap. This study is directed toward the first four steps of the strategic planning process.

As planning studies are undertaken it is often desirable to investigate various models of possible long-term scenarios. The use of models can clarify future possibilities for the institution and its planning team as well as develop issues and problems which need to be resolved. These various options or models if developed in comparison to some critical variables and their relationships to each other, can offer unique insights into the institutional future. Although not all institutions have the option (or desire) to change direction, many private institutions with progressive boards of trustees can entertain the possibility either as a real possibility or as an exercise in planning to develop insights into future relationships.

One of the tenets of the emerging field of Futuristics is that given enough time anything is possible. Applying this to the higher education field and the development of different institutional models, an assumed time frame of 20 years generally would be sufficient for the emergence of the long-term scenario of variable institutional models. Hence the various models are percieved as models either in part or in whole that are possible by the year 2000. It should be noted that if additional time is required to attain an institutional transformation, the time frame can be expanded from an analytical viewpoint because it is not generally considered to be a constraining variable.

An assumption or definition of the institution's initial condition must be made. The initial condition assumption in this analysis is a private comprehensive university of moderate size with a willingness to consider variable long-term institutional modes.

Cross-Impact Matrix

A technique to develop relationships among various events that has been widely used in future studies is the cross-impact analysis. These analyses have been used in studies of foreign policy issues, communications, defense, natural resources, ecology and market and product studies.[1]

The traditional cross-impact analysis has been developed to study the effects or linkages on the probabilities of events and the interactions of these events with each other. To analyze the effects of these linkages, three types of relationships are defined to specify the linkages between two events. First, an unrelated linkage when the occurrence of one event does not affect the probability of another event. Second, an enhancing linkage when the occurrence of one event increases the probability of another event either by enabling it to occur or by provoking its occurrence. Third, an inhibiting linkage, when the occurrence of the first event decreases the probability of the second event either by rendering it either infeasible or impractical or by preventing its occurrence. Enhancing or inhibiting relationships may also be of different strengths, so that a strong enhancing relationship might exist between two events and a weak enhancing relationship between others.

Although there are various ways to conduct cross-impact analysis most of the approaches involve four steps. First, the problem needs to be identified usually by a team of informed and concerned individuals. Second, the major events are identified and defined by the team. Third, a cross-impact square matrix is developed which consists of both initial and second order impacts of various events resulting from the assumptions inherent in the events. Fourth, the various alternatives are evaluated and the process repeated and reviewed. Mathematical probability models may be used in these developments although these have been criticized as possibly leading to a misleading overextension of the validity of the results.[2]

An example of a four by four cross-impact matrix and the linkage among events is presented in Fig. 1. Simple events are listed rather than complex scenarios in order to more readily perceive possible linkages. To a casual observer the simple events may appear to be independent of each other but upon analysis some first order linkages or impacts can be perceived. For example, if the Freshman class decreases by 25% from the previous semester the effect on event B, reduction of Freshman course sections, is perceived to have a relative impact of +3 on an arbitrary scale from +5 to -5, i.e., there would be a relatively strong correlation between a significant decrease in the Freshman class and fewer freshman course sections. However, there would be a weaker impact on the introduction of new academic programs and a potential large impact on a budget deficit. Similar relations exist for the other assumed events.

	EFFECT ON THIS EVENT WOULD BE			
IF THIS EVENT OCCURS:	A	B	C	D
A. Freshman Class Decrease of 25%		+3	+2	+4
B. Freshman Course Sections Reduced	0		-1	-2
C. New Academic Programs Introduced	-2	-1		+2
D. Budget Deficit	0	+1	-1	

Fig 1.--Linkage Among Events in a Cross Impact Matrix

As seen from this example, the stated events are simple and not ambiguous. Also, the perception of the probability of the assumed event needs to be assessed as well as the magnitude of possible linkages. These characteristics indicate the development of these matrices by a knowledgeable and informed group or planning team.

When the assumed events are complex (as e.g., a future state of an academic institution) and contain within themselves many linking relationships, the relevance of the traditional cross-impact approach tends to diminish. To overcome this problem a modified cross-impact approach was developed and applied to the generation of academic institutional models.

Generation of Academic Planning Models

Various higher education programmatic models that an institution could evolve toward by the year 2000 were analyzed. In the traditional cross-impact approach the probability for the occurence of an event is analyzed as well as the probability of the linkages. In this approach we are assuming that the probability of each event (an event now defined as the scenario of an academic model) occurring can be unity. In addition, we are assuming that the event (or model) occurs in isolation from other models and hence, by design, the models are mutually independent of each other. A group of impacted variables are then selected and analyzed from the viewpoint of the impact of each model on the variable.

Eight different models were analyzed. The first is a comprehensive university model as defined by the Carnegie Commission grouping of Research Universities II.[3] A total enrollment of about 10,000 students is visualized for this model with a full range of undergraduate, graduate and first professional programs but excluding a medical school. The second model, a graduate university (analogy Rockefeller University), would have a total enrollment of about 2,000 students. The Consortium University would be amalgamation of two Research Universities II with a total enrollment of 15,000 students. The Regional University would emphasize programs in part-time education, continuing education, professional and technical studies and have a strong market orientation with a total enrollment of about 10,000 students. The Traditional Denominational University would offer undergraduate, graduate and first professional programs on a restricted somewhat regional basis with a total enrollment of about 8,000 students. The Liberal Arts College with a Federation of Professional Schools (analogy Oxford, Cambridge) would offer an array of undergraduate, graduate and first professional programs with an enrollment of 10,000 students. The Upper Division Liberal Arts College, Graduate and First Professional University would be similar to the Comprehensive University without the lower division structure with a total enrollment of 7,000. The Liberal Arts College (analogy Wellesley, Swarthmore, Haverford) would have a few selective graduate programs and a total enrollment of about 3,000 students. It should be noted that it is essential for the planning team or the group performing the impacts to have a clear perception of the various academic models in operational practice as they are defined for the analysis.

Ten impacted variables were used in the analysis as seen in Fig. 2: three enrollment potential variables (undergraduate, graduate and first professional students); two revenue potential variables (private and government sources; two revenue requirements (operational and physical space needs); one variable for relevance to the sponsoring body; one for deviation from institutional tradition; and one for the potential for academic excellence.

Each of the ten factors were analyzed individually as they applied to the eight models. Although it is possible, though debatable, to assign numerical probabilities to the various impact points a verbal scale was developed which by design related to the definition of the variables. The assigned scales (High, Moderate, Low) are used on a relative basis for each impacted variable. Extensive knowledge and perception of the home institution and of the higher education environment is required to produce meaningful scale factors.

The impacts developed as a result of this process are presented in Fig. 2 as an 8 by 10 matrix. Note that the matrix is not square as in a traditional cross-impact analysis. If there is sufficient confidence in the impact values the verbal scales can be quantified as for example giving a high impact a value of three, a moderate impact a value of two and a low impact a value of one. In addition, the impact variables can be weighted (some positively, some negatively). As an example, if the weights given to the ten impact variables were respectively (5, 5, 5, 10, 10, -10, -5, 10, -5, 10) in the form of a 10 by 1 matrix, the matrices

MODEL:	ENROLLMENT POTENTIAL			REVENUE POTENTIAL		REVENUE REQUIR		SPONSOR RELEVANCE	TRADITION DEVIATION	EXCELLENCE POTENTIAL
	UG	GR	PROF	PRIV	GOVT	OPER	PLANT			
COMPREHENSIVE UNIV	High	High	High	High	Mod	High	High	Mod	Low	Mod
GRADUATE UNIV	----	Mod	Low	High	Mod	Mod	Mod	High	Low	High
CONSORTIUM UNIV	High	High	High	High	Mod	High	High	Mod +	Mod	High
REGIONAL UNIV	High	Mod	High	Mod	Mod	Mod	Mod	Mod	High	Mod
TRADIT DENOM UNIV	Mod	Low	Mod	Mod	Low	Mod	Mod	Mod +	Mod	Mod
LIBERAL ARTS COLL & FED OF PROF SCHOOLS	Mod	Low	High	High	High	Mod	High	Mod	High	High
UPPER DIV L A COLL GRAD & PROF UNIV	Mod	Mod	High	High	Mod	Mod	Mod	High	Mod	Mod +
LIBERAL ARTS COLL	Mod	Low	----	High	Low	Low	Low	Mod	High	High

Fig 2.--Academic Planning Model Matrix

may be multiplied to provide an overall figure of comparison for each of the eight models. Their figure of comparison would be consistent with the assumptions, the judgments of the planning team and the weighting factors of the analysis. In this example the resulting figure of comparison would be:

Model	Figure of Comparison
Comprehensive University	85
Graduate University	90
Consortium University	95
Regional University	75
Traditional Denominational University	60
Liberal Arts College & Federation of Professional Schools	90
Upper Division Liberal Arts College, Graduate & Professional University	100
Liberal Arts College	75

The need for a knowledgeable and informed planning team is apparent because the weighting factors are derived from informed judgments.

In conclusion, the cross-impact approach was quite useful in developing a future University model which eventually encompassed various aspects of the eight independent models. The future University model is in the process of being further defined in terms of operational factors such as expenditure and revenue requirements as well as environmental interaction factors.

REFERENCES

1.--"Cross-Impact Analysis" John G. Stover and Theodore J. Gordon, Handbook of Future Research ed. by Jib Fowles, Greenwood Press, 1978.

2.--James R. Bright, Practical Technology Forecasting, Industrial Management Center, Austin, Tex., 1978.

3.--A Classification of Institutions of Higher Education, Revised Edition, The Carnegie Foundation for the Advancement of Teaching, 1976.

An Enrollment Projection Model as Part of the Brockport Budget Process

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The major part of this discussion is how modeling is used within the budget process, rather than the nuts and bolts details of the model itself. Some background on the nature of the budget process is useful because of the very different circumstances under which a State institution operates.

As one of the State operated campuses of the State University of New York, Brockport functions under a series of constraints that do not exist for independent institutions. For example, the tuition rate for Brockport, and for the other State operated campuses is established by the S.U.N.Y. Board of Trustees. There is no consideration of competition and potential tuition level changes, since no competitive advantage can be obtained within the public sector. Similarly, the impacts of various salary increase levels for faculty and staff are not considered. Professional and Technical union contracts cover salary issues and are negotiated at the State level and affect all campuses. Staffing patterns and changes are possible, however, the union contracts also cover situations where personnel are to be retrenched, again limiting individual campus flexibility. The College has a very small endowment and this results in minimal institutional aid, other than the financial aid programs that are available to all students at all colleges, so this variable can also be excluded from the model. Finally, the S.U.N.Y. budget process concentrates upon Full Time Equivalent (F.T.E.) Students generated through instruction, rather than actual revenue. These F.T.E. students serve as the budget base, student/faculty ratios are generated and then F.T.E. faculty positions are allocated to the campus. The Enrollment Projection Model is thus a short range estimate of the anticipated Fall Semester Student Headcount and F.T.E.s that satisfies the data requirements of the budget process.

The Model was used internally to develop enrollment estimates based on seven student components: Continuing Students, First Time Freshmen, Undergraduate Transfers, Returning Students, Non-degree Undergraduates, Matriculated Graduate Students, and Non-matriculated Graduate Students. Over the two year period that the Model has been in use, the major emphasis has been on the estimation of Continuing Students - those students who are currently registered in the Spring Semester and who are anticipated to return in the Fall Semester. All possible outcomes of graduation, attrition, and flow within the institution were considered. Transition probabilities were then calculated from the previous year's experience and applied to the actual Spring enrollment to obtain a Fall estimate for this component. F.T.E.s were estimated using the previous year's registration experience. The estimates in both years were close to the actual results.

Other components were estimated based on several simplifying assumptions the first year, with mixed results. First Time Freshmen and Undergraduate Transfers were considered differently in the second application of the Model, this time based on historical yield patterns of applications to matriculations. As a result, the second set of estimates was almost exactly the same as the final enrollment and F.T.E.s.

This Model has been successful because the ability to provide accurate estimates of enrollment and F.T.E.s within an enrollment driven budget process has enabled the upper level administrators to plan for the upcoming fiscal year staffing and program requirements and anticipated resources.

AN EVALUATION OF GRADUATE PROGRAMS AND STUDENT SERVICES

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I. Introduction

In the Spring of 1981, a questionnaire survey was designed and administered to segments of the graduate student population at the State University of New York College at Brockport. The segments were based upon the current status of each student as matriculated or not matriculated in a graduate program as well as upon the date of the most recent course registration.

The major purpose in conducting this survey was to obtain information on graduate student group degrees of satisfaction with locations of courses and with College services rendered. Heretofore, this particular population was unstudied. This, coupled with a five-year decline in graduate student enrollment, spurred the initiation of this project. This paper, depicting the study, is comprised of two main sections. The first is procedural and attempts to delineate the processes of questionnaire development, sample design, pre-testing and questionnaire administration. The second section is devoted to the analysis, results, and conclusions.

II. Administrative/Procedural Section

Once it was determined that a graduate survey was necessary and feasible, both time-wise and cost-wise, the task became one of identifying the target populations and of developing the actual questionnaire.

A. Sampling Process

The population for this research project was defined as all graduate students enrolled at Brockport from the spring semester of 1978 thru the spring semester of 1981. The frame used to select the sample was a computer listing of all students that fell into the category specified by the population. Some of the information contained in this listing was used to stratify the sample, and as secondary data. The sampling unit was the student's status.

Seven status groupings were identified:

TABLE 1 - STATUS CATEGORIES

	MATRICULATED	NON-MATRICULATED
Currently Registered	REGMAT	REGNON
Recently Registered	RECMAT	RECNON
Previously Registered	PREMAT	PRENON
Graduated	GRADMAT	

Where Currently = Spring 1981

Recently = Spring 1980 thru Fall 1980

Previously = Spring 1978 thru Fall 1979

Graduated = Graduated anytime between Spring 1978 and Spring 1981

The number of students for each of the seven status groupings were totalled and a non-probability, stratified sample was selected:

TABLE 2 - SAMPLE SIZE AND STRATIFICATION

	# of Surveys sent	Percentages
REGMAT	110	11.11
RECMAT	150	15.15
PREMAT	175	17.68
GRADMAT	125	12.63
REGNON	110	11.11
RECNON	150	15.15
PRENON	170	17.17
Sample Size	990	100.00

The sample size was determined by attempting to obtain at least 30 responses from each of the seven categories. The assumption was made that more recently registered students were more likely to respond (this assumption was valid - see Table 3). As a result, for both matriculated and non-matriculated students, previously registered students were sent the largest percentage of the total surveys mailed, followed by recently registered students and currently registered students respectively (see Table 2 above).

B. Questionnaire Development

A brainstorming session provided the direction and the initial questions for the survey. After redefining the survey questions, it was distributed to a number of individuals (i.e. Vice President for Administrative Services, Assistant to the President for Planning and Evaluation, Director of Graduate Academic Services, University Systems Analyst, Director of Data Processing, etc.) for comments and suggestions. Then, a final preliminary version was formatted, incorporating many of the suggestions received. To determine its clarity and time to complete, a pre-test was administered to a graduate seminar. It took less than fifteen minutes to complete and the students experienced little difficulty interpreting the questions. Subsequently, the survey was finalized and mailed.
A self-addressed, postage paid envelope was enclosed. A home address mailing label was put on the postage-paid return envelope in order to identify respondents without asking them to include their name on the survey itself. Also enclosed was a cover letter designed to inform the potential respondent of the purpose of the survey, to indicate why they had been selected, and to emphasize the importance of their participation. The time needed to complete the survey was also included. A positive overtone was added to the letter in an attempt to increase the response rate.

C. Questionnaire Design

The questionnaire itself contained twenty questions. Questions one thru five were multiple choice and elicited demographical information. This information was used to determine the existence of demographical patterns among the students. Questions six thru ten were a combination of multiple choice and open-end type questions included to determine such things as educational levels and current graduate status. Question eleven was a combination dichotomous and open-end. The response to this question may indicate that the respondent's feeling toward Brockport was influenced by his/her previous or current experience with another institution. Questions twelve thru sixteen were Likert Rating Scale type questions designed to determine the various reasons for attending (or not attending) Brockport, for doing graduate work in general, times and locations of current courses, and future preferences for times and locations. All of these questions were included, to in some way measure the feelings toward Brockport in general as an institution. Question seventeen was a modified form of a Likert-type question. Its purpose was to measure the level of satisfaction provided by the services at Brockport. Question eighteen was an open-end question used to obtain suggestions for future or additional services. Questions nineteen and twenty were a combination of multiple choice, dichotomous, and open-end used to elicit information about the respondents' future educational plans.

D. Response Rate

Of the total 990 questionnaires mailed out, 372 were returned, of which 353 were usable. This surprisingly high 37.58% response rate was accomplished on the first wave. Fortunately, this initially high response rate yielded a statistically sound sample (at least 30 responses in each of the seven categories) and no follow-up was necessary.

TABLE 3 - RESPONSE RATES

	RESPONSES	PERCENTAGE
Total # of Responses	372	37.58
Total # of Unusable Responses	19	1.92
Total # of Usable Responses	353	35.66

Category	Usable Responses*	Percentage
REGMAT	69	19.55
RECMAT	56	15.86
PREMAT	41	11.61
GRADMAT	70	19.83
REGNON	39	11.05
RECNON	45	12.75
PRENON	33	9.35

* NOTE: With the exception of the RECNON group, the original assumption that the more recently registered students were more likely to respond has been verified. For example: comparing the REGMAT group to the PREMAT group, we see that 69 out of 110 were returned as compared to 41 out of 175 (refer back to Table 2).

E. Editing, Coding, and Tabulation

The results from this survey were used as input to an SPSS program. Therefore, the editing and coding were geared toward this end and were carried on simultaneously. For each response, the information contained in the actual questionnaire, together with secondary data obtained from the computer listing mentioned earlier, was coded according to the specified instructions. Six secondary data lists were also used in coding the responses to the open-end questions. All of this information was coded onto 80 column card layout forms, requiring four cards per respondent. It was then entered into the computer and stored on magnetic disk pending further processing.

III. Analysis

The analysis phase of this research was conducted using the Statistical Package for the Social Sciences (Nie et al, 1979) employing three specific techniques. Frequencies of the responses for each graduate student group were obtained to establish group profiles. Crosstabs provided a comparison of all of the student groups and their differences on selected variables. Finally, discriminant analysis was used to see if any particular variables were most able to distinguish among the members of each of the groups.

A. Graduate Student Group Profiles (Frequencies)

Registered Matriculated (REGMAT)

The Registered Matriculated Student group is primarily female, between 26 and 40 years old, fairly evenly split between single and married, more than half have some graduate work behind them and nearly half have previously completed a Masters Degree. This group chose Brockport for graduate study because of the academic programs, cost considerations and location. The academic reputation and faculty contact were not as important in the selection of the College.

The most important reasons for graduate work were career advancement, certification or licenses, keeping current in one's field, and self-improvement. These students took few courses at Brockport during the day but did take quite a few during the evening. The other major course location was at the Rochester site, with few courses taken during the day but more in the evening. The most preferred times and locations were Brockport and Rochester during the evening.

In terms of College services, this student group was basically pleased with the academic calendar, admissions, the bursar, course content, departmental advisement, faculty availability, the library, the quality of instruction and registration. They were not displeased with any of the College services, but quite a few were either not used or didn't apply. These included career counseling, the computer center, financial aid, food services, graduate academic services, the health center, open recreation facilities, the placement office and the veterans office.

Recently Registered Matriculated (RECMAT)

The Recently Registered Matriculated Student group is primarily female, between 26 and 40 years old, primarily married, almost all with graduate work and many with Masters Degrees. Important reasons for not continuing in school were achievement of objectives and work responsibilities. Other considerations were family responsibilities and financial reasons. This group selected Brockport based upon academic programs, cost and location. Their graduate work was based on career advancement, certification or licenses, keeping current in one's field and self-improvement.

Students took some courses during the day at Brockport and quite a few during the evening. Very few courses were taken during the day in Rochester, with more taken during the evening. Preferred times and locations were evenings in Brockport and Rochester.

This group was pleased with quite a few of the College services including the academic calendar, admissions, course content, departmental advisement, faculty availability, the library and the quality of instruction. They are somewhat displeased with the bookstore, the bursar and registration. Services not used or not applicable were career counseling, the computer center, financial aid, food services, graduate academic services, the health center, open recreation facilities, the placement office and the veterans office.

Previously Registered Matriculated (PREMAT)

The Previously Registered Matriculated Student group is primarily female, between 26 and 40 years old, split between single and married, most with graduate work and half with advanced degrees. Reasons for not continuing are dissatisfaction with the program, family responsibilities, financial reasons and work responsibilities. The selection of Brockport was based on the academic programs, cost and location. Graduate study was based on career advancement, career change, certification or licenses, keeping current in one's field and self-improvement.

Some courses were taken at Brockport during the day and quite a few at night. Essentially, none were taken in Rochester during the day and some courses were taken at night. Evening Brockport and Rochester courses were the ones most preferred.

The satisfactory College Services were the academic calendar, admissions, course content, departmental advisement, faculty availability, the library, quality of instruction. They are displeased with public safety and registration and did not use or need career counseling, the computer center, financial aid, food services, graduate academic services, the health center, open recreation facilities, the placement office and the veterans office.

Graduated Matriculated (GRADMAT)

The Graduated Matriculated Student group is basically female, primarily 31 to 40 years old, married and usually with children, and all had Masters or higher degrees. These students were no longer enrolled because they had achieved their objectives through graduation. Brockport was selected based on academic programs, academic reputation, cost, faculty contact and location. Graduate work was aimed at career advancement and change, certification and licenses, keeping current in one's field and self-improvement. Few courses were taken during the day and most evening courses were at Brockport. Most courses were preferred at night in Brockport and Rochester.

This group was pleased with almost all College services, displeased with none and unaware of, or not requiring, career counseling, the computer center, financial aid, food services, the health center, open recreation facilities, the placement office and the veterans office.

Registered Non-Matriculated (REGNON)

The Registered Non-matriculated Student group is evenly split between male and female, between 22 and 40 years of age, split between married and single, most have some graduate work but few have Masters degrees. Brockport was chosen for graduate work because of the academic programs, cost and location. Graduate courses are for career advancement, certification and licenses and self-improvement.

Most courses are taken during the evening with a balance between Brockport and Rochester. Most prefer evening courses, both in Rochester and Brockport.

These students are pleased with course content, faculty availability, quality of instruction and registration. They are not generally displeased with any area but are unfamiliar with career counseling, the computer center, financial aid, food services, graduate academic services, the health center, the library, open recreation facilities, the placement offices, public safety and the veterans office.

Recently Registered Non-Matriculated (RECNON)

The Recently Registered Non-matriculated Student group is primarily female, between 26 and 40 years old, split between married and single and most have graduate work and many have advanced degrees.

Reasons for not continuing graduate work include achievement of objectives, financial reasons and work responsibilities. Brockport was chosen for graduate study because of academic programs, cost and location. Career advancement, certification or licenses, keeping current in one's field and self-improvement were important reasons for graduate work.

Many courses were taken at Brockport, generally during the day with some taken in Rochester at night. Brockport day and night classes and Rochester night classes were most preferred.

College services seen as satisfactory were admissions, the bursar, course content and quality of instruction. None were seen as unsatisfactory, but many were not used or didn't apply, including career counseling, the computer center, departmental advisement, financial aid, food services, graduate academic services, the health center, the library, open recreation facilities, the placement office, public safety and the veterans office.

Previously Registered Non-Matriculated (PRENON)

Finally, the Previously Registered Non-matriculated Student group is primarily female, between 26 and 50 years old, generally married with children, most have some graduate work and half have graduate degrees. Reasons for not continuing include achievement of objectives and no program available. Brockport was selected primarily for location, but also for cost. Reasons for graduate study included career advancement, keeping current in one's field and self-improvement.

Quite a few courses were taken at night in Brockport and somewhat fewer in the day. Very few courses were taken during the day in Rochester and some in the evening. No consensus exists on preferred times and locations.

These students are pleased with course content and the quality of instruction, not displeased with any of the College services and unfamiliar with most of them.

B. Graduate Student Group Comparisons (CROSS TABS)

While there are a great many similarities among the seven graduate student groups, unexpected because of the time period under study, there are some areas where comparisons pointed up differences. The REGNON group is composed of younger students than the other groups. The REGMAT and REGNON groups have more single students than the other group and also have fewer people with Masters degrees.

The GRADMAT group has extremely high achievement of objectives as a reason for not continuing. Matriculated students are more likely than non-matriculated students to cite family responsibilities as the reason for not continuing. While, the non-matriculated students mentioned program unavailability.

The selection of Brockport for academic program reasons was greater for matriculated than non-matriculated students. Graduated students were the only ones to emphasize academic reputation. Cost and location were somewhat more important to matriculated than non-matriculated students.

Career change as a reason for graduate study was important for the PREMAT and GRADMAT groups. Self-improvement was more important for the GRADMAT group. Non-matriculated students had more classes at Brockport during the day than matriculated students, and the reverse was generally true for the evening classes.

Matriculated students tend to be more satisfied with College Services and aware of or use more of them than non-matriculated students. Graduated students were the most positive of all.

C. Graduate Student Group Differentiation (Discriminant Analysis)

The first attempt at group differentiation examined the variables measuring why Brockport was chosen for graduate study. Cost and academic program were the two most important variables, however, the resulting analysis and classification served only to separate GRADMAT from the other six groups and to classify only 46 percent of the cases successfully.

The next analysis focused on the variables examining why graduate study was important. Career change and career advancement were identified, but classification was very poor with only 19 percent correct and no particular groups identified.

The third analysis considered College service levels of satisfaction. Departmental advisement, academic calendar and graduate academic services were identified as the most important variables. The overall level of classification was low, 30 percent. However, the classification into matriculated and non-matriculated segments was very successful with over 60 percent correct placement.

Finally, all of the above variables were used and the results were very similar to the third analysis. The analysis resulted in matriculated and non-matriculated student groups, without any differentiation according to the time of the last registration that distinguished the original group membership.

IV. Conclusion

This survey research project has discovered that students' images of the College have not changed greatly over time and that there are some, although not dramatic, differences between matriculated and non-matriculated groups. The basic profile is female, age 26 to 40, married, with some graduate work and often a Masters degree. Those who are no longer enrolled have achieved their objectives, although some cite other responsibilities as also having an impact. Brockport was chosen because of the academic programs, cost and location, while graduate work was for career change, certification and licenses, to keep current and for self-improvement.

Students were satisfied with the academic services of the college, the library, course content, faculty availability and departmental advisement -- but had mixed reactions to several of the other services such as the bursar, registration and public safety. Many additional services were not used or not needed.

REFERENCES

Biddle, S. and Elliot, J., "Analytic Studies' Graduate Student Survey." Unpublished Paper. SUNY College at Brockport, 1981.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, C. H. (Eds.). *SPSS statistical package for the social sciences*. New York: McGraw-Hill Book Company, 1979.

MARKETING FOR CONTINUING EDUCATION NEEDS

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The combination of Institutional Research (IR) and marketing might initially appear an unlikely partnership. Why would IR do a market research study? Traditionally, IR has directed its efforts toward dealing with institutional data on faculty and students for internal use; marketing has focused on selling products to the public in an external environment. A current analysis of these endeavors shows they have expanded the range and scope of their services--institutional researchers are no longer just number crunchers just as marketers are no longer soap peddlers. In the expansion of their services the lines between the two have become blurred.

Two major tasks of IR are headcounting--How many FTEs do we have today? -- and forecasting -- how many FTEs will we have in 10 years? In marketing terms, IR is sales forecasting; projecting the demand for its educational product. Enrollment forecasts have generally been based upon an institution's historical data, with additional variables such as tuition increases added in. Drastic changes in the external environment, particularly the decrease in the 18-22-year-old population, have rendered historical forecasting methods inaccurate. Because forecasts are used for budgeting, staffing, and curriculum decisions, policy makers are demanding better and more accurate data about future enrollments. As the market changes, IR is faced with the task of developing alternate forecasting methods.

Marketing provides tools and techniques generally not familiar to IR. Business forecasting focuses on the external environment -- How do changes in the marketplace affect the demand for a product? Using this perspective, external factors which influence the educational market are identified. A partial list includes:

--age shifts
--geographic shifts in the population away from the northeast
--demand for courses based on job availability
--economic profile of a geographic region
--competition from other colleges
--competition from training organizations
--governmental regulations on financial aid

Fragmentation and shrinkage of the traditional college market are forcing post-secondary institutions to make changes to maintain enrollments. One such change is the growing tendency to include programs for part-time students. IR, as a planning office, has been asked to supply information about new directions for the institution. Therefore, it is a logical step to involve market research in this process.

What are the benefits of a marketing study? The goal of marketing is to find a need and fill it. To achieve this goal, market research provides information about market segments, demand for a product, market share and competition, demographic and economic trends which affect demand, and internal resources necessary to meet demands. Planning how to fill identified needs is the second step in marketing.

Market segmentation is the division of the market into subsets based on demographic, geographic, psychographic, benefit and usage data. For example, educational markets can be segmented by age, type of degree desired, benefits perceived, benefits desired, or current educational level of the general population (Figure 1). Each segment or subset identified is then studied to assess its specific educational needs, demands, and characteristics (Figure 2). Included in an assessment of a segment are current levels of

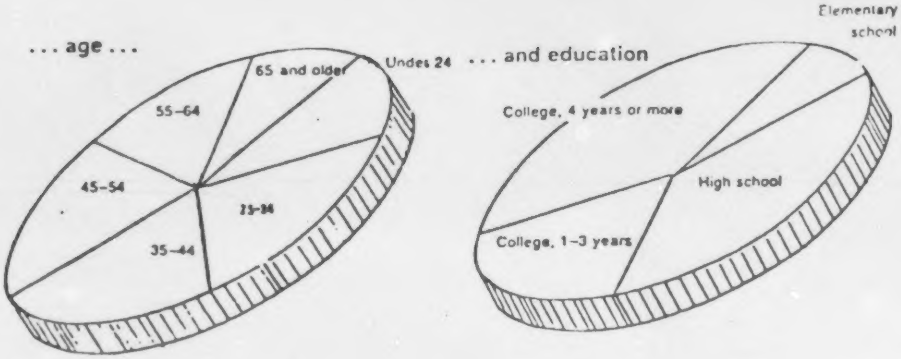

Figure 1. Market segmentation of population by age and by education.

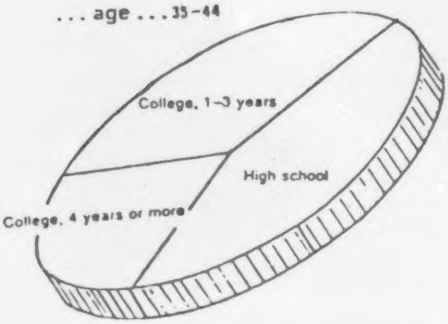

Figure 2. Segmentation of 35-44-year-old population by education.

educational income, occupation, place of employment by place of residence (commuting patterns), which educational needs are being met and not met, how and by whom are these met, and others.

Information is collected from published or secondary sources, and if necessary through primary research. From the data an assessment of market share, demand for courses, and economic variables which influence a specific segment are identified. In short, a need has been found. An institution which has completed such a marketing study is then in a position to carve out a unique niche not served by others.

Under a grant from the Metropolitan Life Foundation, University of Maryland University College's Office of Institutional Research conducted a market research project assessing the demand for continuing education by industry in the Baltimore-Washington region. Specifically the project was designed to:

(1) identify current continuing education demand by business and industry;

(2) forecast continuing education demand through 1985;

(3) identify current educational providers;

(4) determine the market share held by each educational institution in the region.

Using secondary data, an economic profile of the region was drawn to assess current population and industry demographics, and to provide a 10-year forecast. To assess the specific educational needs of businesses, a short questionnaire[1] was developed and sent to selected firms.

Business firms were included in the study if they: (1) had 50 or more employees; (2) were located in the Baltimore-Washington corridor; and (3) were major employers as measured by percent of the labor force employed.

The industrial classifications included construction, manufacturers, research and development (R&D) firms, retail department stores, commercial banks, business services (including data processing firms), and engineering firms. A computerized demographic data base was developed and data on 420 firms were entered.

The 24-item questionnaire was mailed to directors of personnel at 370 firms; a stratified random sample of 50 firms was selected to participate in interviews. The interviews served as a measure of reliability for the questionnaire and allowed in-depth responses to items.

Responses were received from 36% of the firms. Banks and business services had the highest response rates, 44% and 43% respectively. Response rates for the survey by industry were

Commercial banks	44%
Business services	43
Research and development (high technology) firms	31
Construction firms	29
Department stores	18
Engineering services	18
Manufacturing firms	6

Number of employees in the responding firms fell into a bimodal distribution with firms employing either less than 150 or more than 300 employees. The mean number of employees was 599; the median was 144 employees. The largest occupational categories were clerical (N=90), technical (N=64), and professional (N=72). Respondents' projections for type of employee needed in 1986 indicate a continued concentration of technical and professional employees.

Training programs are offered by 71% of the firms but less than half of the companies require employees to participate in them. Enrollment in academic programs is encouraged by 82% of the companies surveyed but required by less than 10%. Firms are more interested in seminars, credit undergraduate and graduate courses, and conferences. Companies are particularly interested in data processing courses for all staff--clerical, technical, managerial, and professional. Other content areas of interest include professional continuing education, engineering, and management courses. The emphasis on technical content areas and preference for seminars and graduate courses reflect the high concentration of high technology and business services firms in the Baltimore-Washington region. Based on employment and business projections for the next decade, this pattern of educational demand should continue.

This study identifies a market segment previously unexplored by most educational institutions. Recognition of new student populations, paired with an assessment of their specific needs and an overview of the regional trends which affect employment patterns, provide data on which to base internal planning decisions. The information generated by market surveys can be used to develop new courses, modify the type and number of courses offered, modify delivery systems, and suggest appropriate times for and locations of classes.

At University College the partnership of IR and marketing has resulted in the establishment of a marketing data base which will be updated and expanded on a regular basis to include new student populations interested in continuing education. The partnership will continue to provide data that will be essential for long range planning for growth--or for some, survival.

Footnotes

[1] For a copy of the questionnaire and/or additional data, please write the junior author.

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DEGREE PATTERNS - AN INDICATOR OF INSTITUTIONAL AND STATE RESPONSIVENESS

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Educational Responsiveness and Environmental Press

Values, attitudes and complexities on one side, versus political and economic considerations on the other are important elements in the fabric of educational priorities (Mahan, Zarle and Joyce, 1980; and Astin, 1977). There is an unavoidable tension in the duality of values versus the pragmatic in higher education. This duality is no where more evident than in the relationship between traditional academic objectives on the one hand and occupational, vocational objectives on the other. For at least the last hundred years our colleges have, in addition to broad educational goals, increasingly also been asked to prepare people for the world of work. There is no escaping the reality that higher education is a basic necessity for many people in our increasingly complex society. It is no longer a socially distinguishing garnish for the favored few.

As long ago as 1961, Halsey, Floud, and Anderson recognized the linkage between education, the economy and society. They edited an anthology that was written by authors drawn from both sides of the Atlantic. Jean Floud and A.H. Halsey expressed the connection of education to the economy and society (note - society for them had an economic connotation) very clearly:

> Education attains unprecedented economic importance as a source of technological innovation, and the educational system is bent increasingly in the service of the labor force, acting as a vast appartus of occupational recruitment and training. Social selection is added to its traditional function of social differentiation (p. 2).

Higher education because of the variety of societal expectations faces therefore a duality in defining its mission. On the one hand, there is the need for caution based on well established academic ideals: the responsibility for communicating society's accumulated culture is a heavy responsibility. On the other hand, the growing linkage with the economy and the differentiation of an industrial society calls for responsiveness. The good health and fortunes of education are now tied, and will be increasingly tied, to the ability of institutions, individually and collectively, to respond to the changing needs of the economy and society. The public is showing more concern with direct return on their investment in education and are less willing to accept assumptions promising only possible and general benefits.

Ben-David (1972) in contrasting European and American higher education, noted that in the United States there is greater decentralization than in Europe. He further suggested that the American system has been more responsive to change than its counterparts in some parts of Europe. I believe that the decentralized system in the U.S. favors rapid adaptation to changing needs. Should the rate of change continue to accelerate, and it probably will, there will be a growing need to understand where and how response should take place in the educational system. When change is relatively gradual the innovators can respond first, and the more conservative can follow along behind. There is greater risk, even danger, for institutions in a cautious approach in times of rapid change. For example, it is important to know which disciplines are growing and which ones are contracting. There is no use relying on a particular discipline or department to offset the demographic depression of the next fifteen years, if that department's programs are likely to face declining demand. Rather, an institution that hopes to offset contracting enrollment markets should place resources where discipline growth can be expected.

Change is a continuous reality for individuals, institutions, and society. Change can involve a gradual evolution process, a discontinuous jump, cycles of variation, or something more like a wave effect. Nathaniel Mass and Peter Senge (1980) suggested there are long and short waves in the economy. I have hypothesized there are important wave effects in higher education. The importance of this suggestion for institutional planning is that wave effects in society will vary the demand for different college programs. Responsiveness to these variations is important for the continued viability of an institution. Unfortunately, there are a number of factors working against responsive adaptation in higher education. Incremental budgeting, aging faculty, high proportions of tenured faculty, and growing centralization are a few of the factors involved in inhibiting responsiveness. Much imagination and vigorous effort will be required to respond effectively to the challenges that lie ahead. Figure 1 is an attempt to clarify the factors involved in assessing and stimulating responsiveness in higher education.

A Backward Look - Areas of Past Responsiveness

It is important to keep in mind that the problems that are likely to confront higher education in the next two decades are largely ones born of past success. Even if the full effects of the demographic depression are translated into actual enrollment declines, enrollments will have been set back only to the levels of a decade or so ago. It is perhaps even more important for the long-term future of education to recognize the probability

A DESCRIPTIVE MODEL FOR ASSESSING AND STIMULATING INSTITUTIONAL AND SYSTEM RESPONSIVENESS

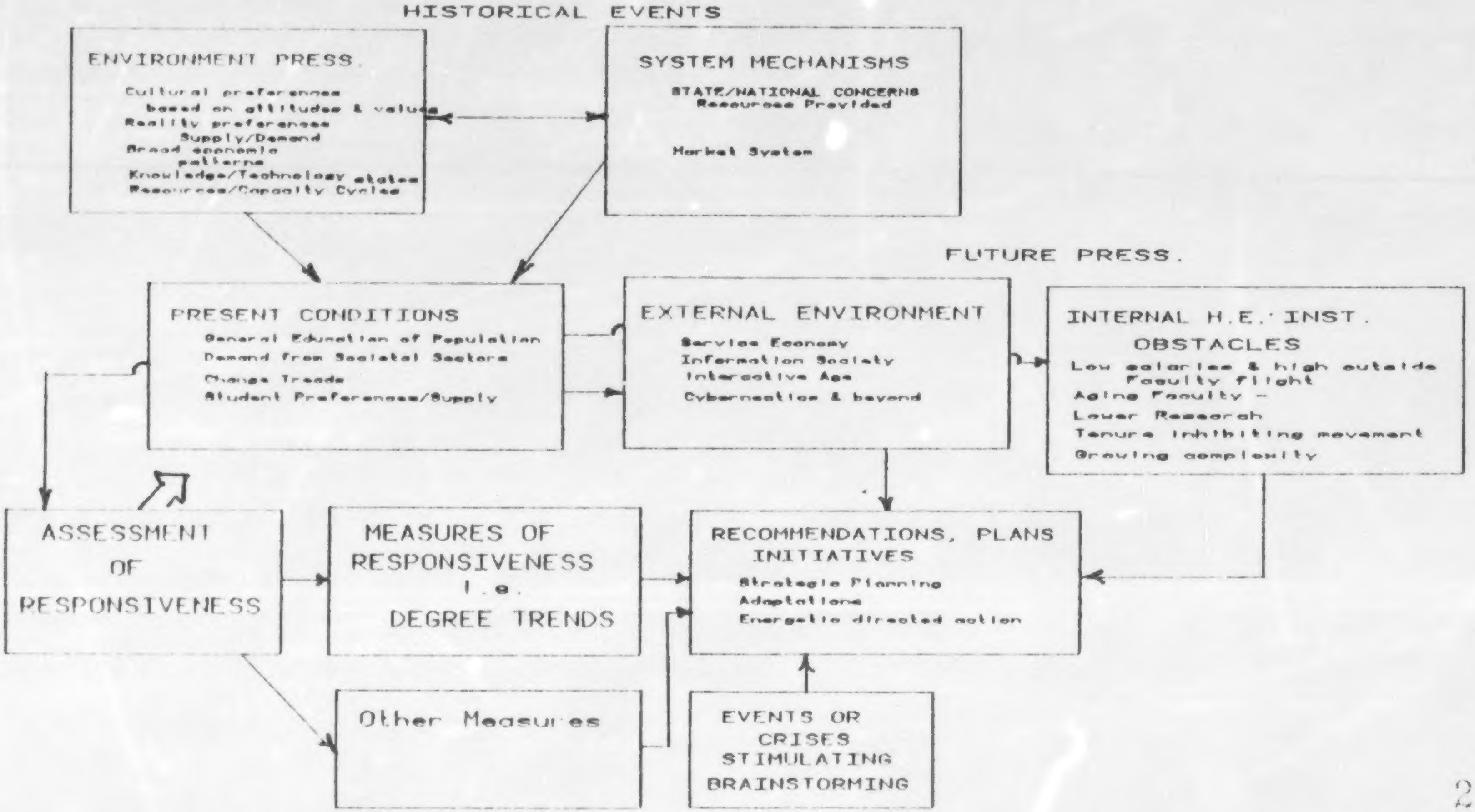

HISTORICAL EVENTS
ENVIRONMENT PRESS.
Cultural preferences based on attitudes & values
Reality preferences Supply/Demand
Broad economic patterns
Knowledge/Technology states
Resources/Capacity Cycles
SYSTEM MECHANISMS
STATE/NATIONAL CONCERNS
Resources Provided
Market System
FUTURE PRESS.
PRESENT CONDITIONS
General Education of Population
Demand from Societal Sectors
Change Trends
Student Preferences/Supply
EXTERNAL ENVIRONMENT
Service Economy
Information Society
Interactive Age
Cybernetics & beyond
INTERNAL H.E.'INST. OBSTACLES
Low salaries & high outside Faculty flight
Aging Faculty –
Lower Research
Tenure inhibiting movement
Growing complexity
ASSESSMENT OF RESPONSIVENESS
MEASURES OF RESPONSIVENESS i.e. DEGREE TRENDS
RECOMMENDATIONS, PLANS INITIATIVES
Strategic Planning
Adaptations
Energetic directed action
Other Measures
EVENTS OR CRISES STIMULATING BRAINSTORMING

FIGURE 1

that enrollments will climb again in the early part of next century. The climb, if it occurs, will not be caused so much by a change in the birthrate but by the larger number of children that will be born of the student bulge of the seventies. Demographics are therefore the basis for a primary wave in education.

It is my contention that American education, whatever its shortcomings might be, has been highly responsive in the past to the needs of society and the economy. The success is due in large part, I suggest, to the structure of higher education, a structure which allows the system to respond quickly to environmental change.

To substantiate this claim, let me describe briefly some of the important response patterns of the past. The American economy has been going through changes or waves for many decades and can be expected to continue to do so in the future. The waves may be summarized into three basic forms: basic industry, secondary industry, and the service economy. Each wave has required a different critical mass of skills from the workers in the new-wave industries. Furthermore, the requirements become more complex with progress. We should not therefore be surprised that the task of institutional planning also becomes more complex in catering to a more demanding society. The complexity can be expected to continue into the future, as the service economy develops into the information age and then beyond. In the early stages of industrialization the task of education was to equip people with basic literary skills so that the new social structure could function. Higher education has had to focus for a long time on teacher education, not only because the industrial era needed basic skills from its workers, but because of the dramatic growth in population which accompanied the industrial age. My hypothesis is that education has matched and followed the needs of society, so that illiteracy has dropped dramatically, years of schooling have increased, and more recently the college going proportion of the population has become the majority of a high school graduating class (Hester, 1980 for more details). Many significant changes have been accomplished in order to meet particular needs, all while the size of the general population has continued to grow dramatically.

Planning in the early stages of the development of higher education was a relatively simple task. Course offerings were fewer and they were repeated over extended periods of time. The extension of industry into wider activities inevitably led to the widening of education. The outcome for administrators has been in turn to make education and planning for it more complex. There is a further aspect to the complexity: the more specialized education becomes, the less elastic the use for its possessors becomes. The system itself also becomes less elastic because the system has to employ a whole series of specialists in order to function. Skills in this kind of environment become increasingly less transferable. Communications become very important because of the need for coordination and need to maintain decision making in an increasingly centralized system. If democracy is to flourish in a complex environment, education must play a continuing and central role in making people aware of the environment outside their own discipline. It is vital that our planning recognize the tension between the need for the broadly educated person and the need for the imparting of skills for particular disciplines. While for a college this tension is primarily a curricular issue, it is also a planning issue, because the understanding of underlying trends in education is essential to effective planning.

Degree Data

In order to understand better trends in higher education, data were compiled on degrees awarded in New York State over a twenty year period. Two digit HEGIS categories and degree levels were used to group the data and analyze for trends. It is not the purpose of this paper to present detailed analysis of this study but rather to suggest to institutional and state planners that degree patterns are a rich resource for understanding trends. From the state aggregate numbers, broad trends may be detected, and from individual institution figures, local patterns may be identified. The same procedure could of course be pursued for a sub-trend analysis, by using four digit HEGIS areas. At the institutional level, the degree of deviation from the state trend might be very valuable knowledge to obtain.

Over the twenty year period the total number of degrees increased by 239 percent. There was a marked growth in the number of degrees at the associate and baccalaureate levels. The number of doctoral degrees increased by 212 percent. In very marked contrast are the individual HEGIS areas, in which a variety of patterns exist. Figure 2 presents seven major HEGIS areas for New York State; the same areas are presented for Pennsylvania in Figure 3. These suggest that patterns have broad as well as local causes. Three main areas -- education, engineering, and computer science -- are broken out by degree level in figures 4, 5 and 6 to illustrate the very different patterns that have taken place from one program area to another. Engineering is characterized by a series of short waves. Computer science is in a period of considerable growth and is an example of a rising wave.

FIGURE 2

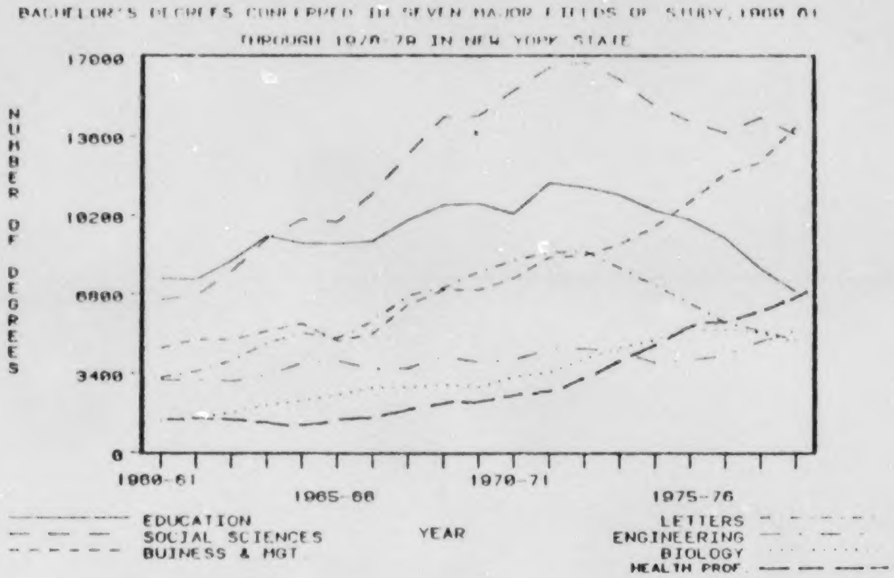
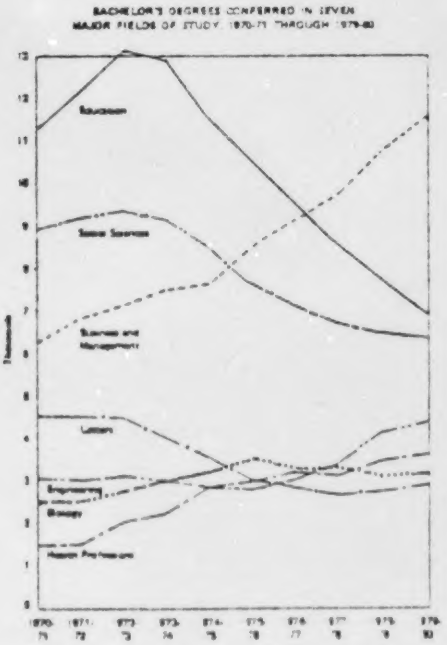


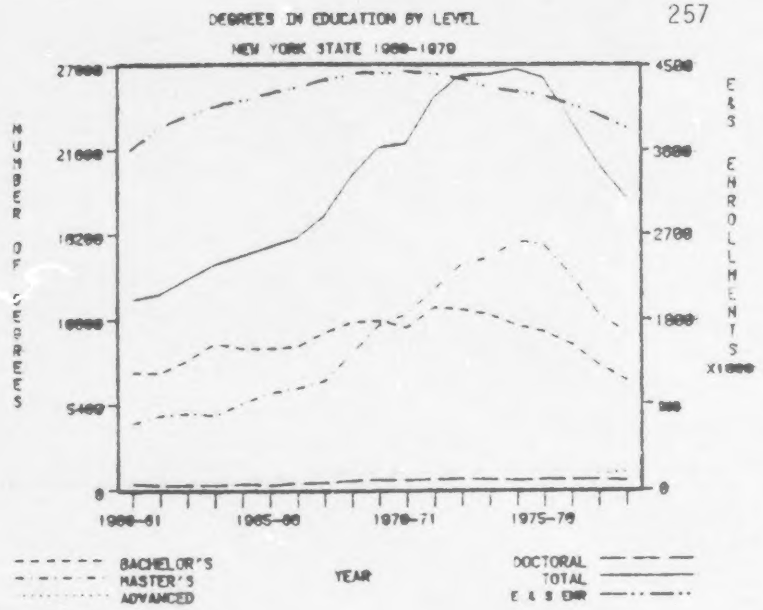
FIGURE 3



SOURCE: Our Colleges and Universities Today.

Pennsylvania Department of Education, 1981

FIGURE 4



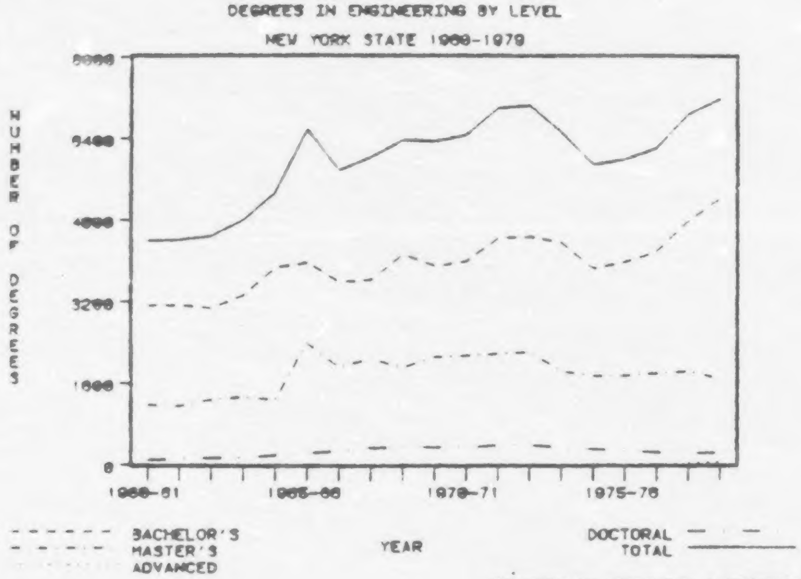


FIGURE 5

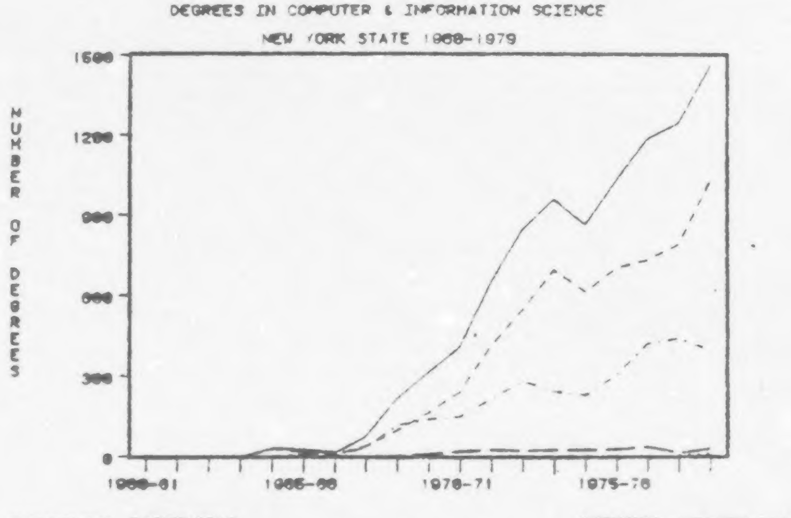


FIGURE 6

Education has experienced both a rapid rise and a steep decline. Each of these patterns is to be found in other program areas which lends support to the notion that wave effects operate across all of higher education.

In addition to the primary demographic wave that is in the process of developing at the present time, there are other waves which are important for planners to identify and then monitor over time. Some waves, for example, engineering, appear to be characterized by cycles of short periodicity. There are others, of which education is an example, in which the wave pattern reaches over several decades. Some areas, for example computer science, are in a period of considerable growth. Further research could profitably look for dependent variables and assess lag or lead times for all such waves. An analysis of sub-program areas (four digit HEGIS) would probably reveal whether there are separate patterns within a broad program category. It would also be important to identify catalysts of sudden change. Figure 4 includes a graph of primary and secondary school enrollments reduced to the same scale as used for degrees awarded. The close correspondence of the two graphs is probably significant; other variables might be equally revealing. The combined graphs suggest that when the schools start to receive more children again, an upward wave pattern will occur in teacher education enrollment at the college level, assuming that other social factors correspond.

The study also raises the question of over-and under-reaction to changes in job market demand by students and what can be done to smooth reaction. One response might be to ask whether institutions should anticipate changes and open up or expand some programs and contract or close down others? There is clearly an important role for state agencies in providing the campuses with statewide data and also in the area of program review policy. The study clearly suggests that over the past twenty years institutions have responded dramatically to changing demand. The study raises the further question that as society moves towards the service econony: Can responsiveness be improved?

Conclusions

There can be little doubt that the higher educational system has been responsive in the past to a changing society. The diverse system has been aided in the process of adaptation, in the past, by the availability of resources and a rapidly expanding student market. The next fifteen years will be marked by limited resources and a smaller student pool. All the indicators are that responsiveness will be critical to success in the next decade and half and should be a central planning criterion.

The future will probably require that higher education have a much broader planning approach than in the past, one that has strategy as a major focus. For strategic planning it will be necessary to develop much more sophisticated tools for the endeavor; this paper has suggested one set of tools, based on statistics on degrees awarded to reduce one element of uncertainty. To be successful, however, it will be necessary for institutions to apply considerable energy to the tasks of planning and adapting. Structural reforms, new ways of using resources, and much more rapid adaptation to the environment will be essential elements for institutions to consider in order to survive in good shape. Fifteen years is both a long and a short time depending on the perspective. Good planning could make the next period beneficial for the long-run of education, despite possible short-run difficulties. Growth is likely again in the future and it is important that we pass our institutions on to the next generation in the best possible condition.

REFERENCES

Astin, A. Four Critical Years. San Francisco: Jossey-Bass, 1977.

Ben-David, Joseph. American Higher Education: Directions Old and New. New York: McGraw-Hill, 1972.

Halsey, A.H., Floud, Jean.and Anderson, Arnold C. (Ed) Education, Economy, and Society. New York: The Free Press of Glencoe, Inc., 1961.

Hester, Donald G. Towards a definition of Excellence in Higher Education. Institutional Research in the Decade Ahead: Enhancing Performance, Amherst, MA, NEAIR, 1980.

Mahon, James L., Zarle, Thomas H. and Joyce, Beverly A. Design and Implementation of a Student Environmental Assessment Model for Application in Institutional Decisionmaking. Institutional Research in the Decade Ahead: Enhancing Performance. Amherst, MA, NEAIR, 1980.

Mass, Nathaniel J. and Senge, Peter M. "Reindustrialization: Aiming for the Right Targets," Technology Review, August/September, 1981, 56-65.

REAGANOMICS and RESEARCH: Institutional Implications

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Over the past few years, there have emerged several areas of common concern to higher education in general and institutional researchers in particular. Indeed, it would have taken a concerted effort to uncover a professional conference or departmental meeting that failed to include in its agenda a reference to: "Demographics and the declining 18-year-old population" or "SAT's and the declining test score." In response to the prospects of a shrinking pool of quality students, a number of postsecondary institutions have begun to look at a "back-to-basics" curriculum in which the "3R's" receive added emphasis. However, in response to continuing federal initiatives, schools and colleges must begin to divert their attention from "Readin', 'Ritin', and 'Rithmatic" to the "3R's of the 80's": Reaganomics, Recruitment and Retention.

Spending cuts being proposed and implemented in Washington threaten to affect higher education in ways for which students, families and postsecondary institutions themselves may be totally unprepared. If federal student aid was considered to be a planning issue in the 70's, the question would have been: "what will we do with all of this money?"

As federal student aid is addressed as a planning issue for the 80's, the question will become: "what will we do without all of this money?" With federal student aid support approaching $6 billion in 1981, there are few if any institutions unaffected by proposed reductions. Before speculating on where we might be going, we should first examine how we got to this point.

While federal involvement in "campus-based" student aid began with the passage of the National Defense Education Act in 1958, the major initiatives were launched in the 1960's. In particular, the Higher Education Assistance Act of 1965 helped to introduce the concept of postsecondary educational "access" as an intent for federal student aid support. Based upon "demonstrated financial need," financial aid programs authorized under Title IV of the Higher Education Act were developed to ensure that all qualified deserving applicants were given access to higher educational opportunity.

In the 1970's, the concept of "choice" was added to that of "access" in an effort to eliminate educational cost as the determining factor in a student's enrollment decision. Aid from Basic Educational Opportunity Grants (now referred to as PELL Grants), Guaranteed Student Loans (GSL) and other programs was intended to lower financial barriers for "needy" students interested in and accepted at high(er) cost educational institutions.

In October 1978, "access" and "choice" were joined in the higher education financing equation by the concept of "comfort." The Middle Income Student Assistance Act (MISAA) was designed to address the needs of students whose families were caught in "the middle income squeeze" by expanding eligibility criteria for Basic/Pell Grants and removing income restrictions for Guaranteed Student Loan (GSL) eligibility. Coupled with the congressional ratification of the Education Amendments of 1980, REAUTHORIZING Title IV student aid programs through 1984, the decade of the 1980's promised to be the best yet for students, parents, colleges and universities. However, as "Reaganomics" begin to take effect, the promise of ease and equality of educational opportunity has already begun to fade.

The primary target of budget cutters is the Guaranteed Student Loan Program. Since 1978, any graduate or undergraduate student has been eligible for GSL assistance without regard to family income or individual need. As a result, federal expenditures for GSL subsidies increased from $2 billion in 1980. While eligibility was opened up to ease the "middle-income squeeze," the Program is now under attack by those who contend that federally-subsidized GSL's are being used, by parents who can afford college costs, to "play the money market." In response to these criticisms and concerns, GSL eligibility criteria have been tightened for families whose income exceeds $30,000.

While the stated targets of the GSL cuts are waste and abuse, middle class families will feel the impact as "comfort" is eliminated as a stage in the college decision/financial aid process. As many as one million current GSL borrowers may find themselves ineligible for assistance another year. The implications of GSL on attrition/retention would appear to be significant. When considered in light of other government cuts in educational spending, the situation becomes a critical one for many institutions.

The Administration's next round of cuts calls for a 12% "across the board" reduction in spending. Implementation of this proposal would result in the loss of nearly $150 million in "campus-based" funding fo the National Direct Student Loan (NDSL), Supplemental Educational Opportunity Grant (SEOG) and College Work-Study Programs (CWSP). Coming at a time when many institutions face a 13% increase in tuition, the cuts will be devastating for some schools and at least WORRISOME for even the most well-endowed institutions. Dividing the shrinking student aid dollar among the "truly needy," "merely needy" and "nearly needy" will present a challenge to policy makers at all levels. Marketing and packaging strategies will become increasingly important as students and their families begin to look more closely at the issue of "choice" in their educational decision-making. Elimination of GSL eligibility; cuts in "campus-based" funding; and reductions in PELL Grant assistance will cause institutional strategists to make some hard decisions: should limited institutional monies be redirected toward merit-based scholarships? will reduced financial aid funding be directed to recruitment or retention efforts? are there "institutional intangibles" that could help offset the negative impact of reduced aid packages?

The focus of "Reaganomics" has been on the more affluent consumers of education, suggesting that the interests of the "truly needy" would be protected. In fact, however, major cuts have been made in program areas affecting needy students. In August, as part of budget cuts proposed by the Reagan Administration, Congress voted to phase out Social Security educational benefits for college students whose parents are dead, disabled or retired. Students who matriculate after May 1, 1982 will be ineligible for the program; students presently receiving benefits will have their payments reduced by 25%. As many as 625,000 will be affected and, as they look for ways to meet their increased needs, they will join their middle-income classmates facing cuts in other financial aid programs. PELL Grants, established in 1973 as Basic Educational Opportunity Grants (BEOG), have already been cut this year from a legislated maximum award of $1900 to $1670. Further cuts, coupled with the elimination of Social Security benefits and the reduction in other programs may well have an effect on students' "access" to education beyond high school.

Clearly, the issue at hand and its implications, cannot be seen as being of concern to only the Admissions and Financial Aid Office. Rather, "Reaganomics" and its impact must be considered as an institutional issue. Never before has it been so important for an institution to know its applicant pool. Colleges and universities who have not already done so must begin to look beyond the "how many are they" to the "who are they" in the admissions process.

Steps must be undertaken to ensure that the institution identifies and understands its primary market. The institution must be able to measure and predict the impact of federal aid cuts on its own applicant pool and student population. If, for example, an institution relies upon a lower-income or economically disadvantaged student population, Pell Grant and Social Security cuts will have a significant impact. On the other hand, an institution whose primary market is predominantly middle-class, will be hit hard by eligibility restrictions for Guaranteed Student Loans (GSL).

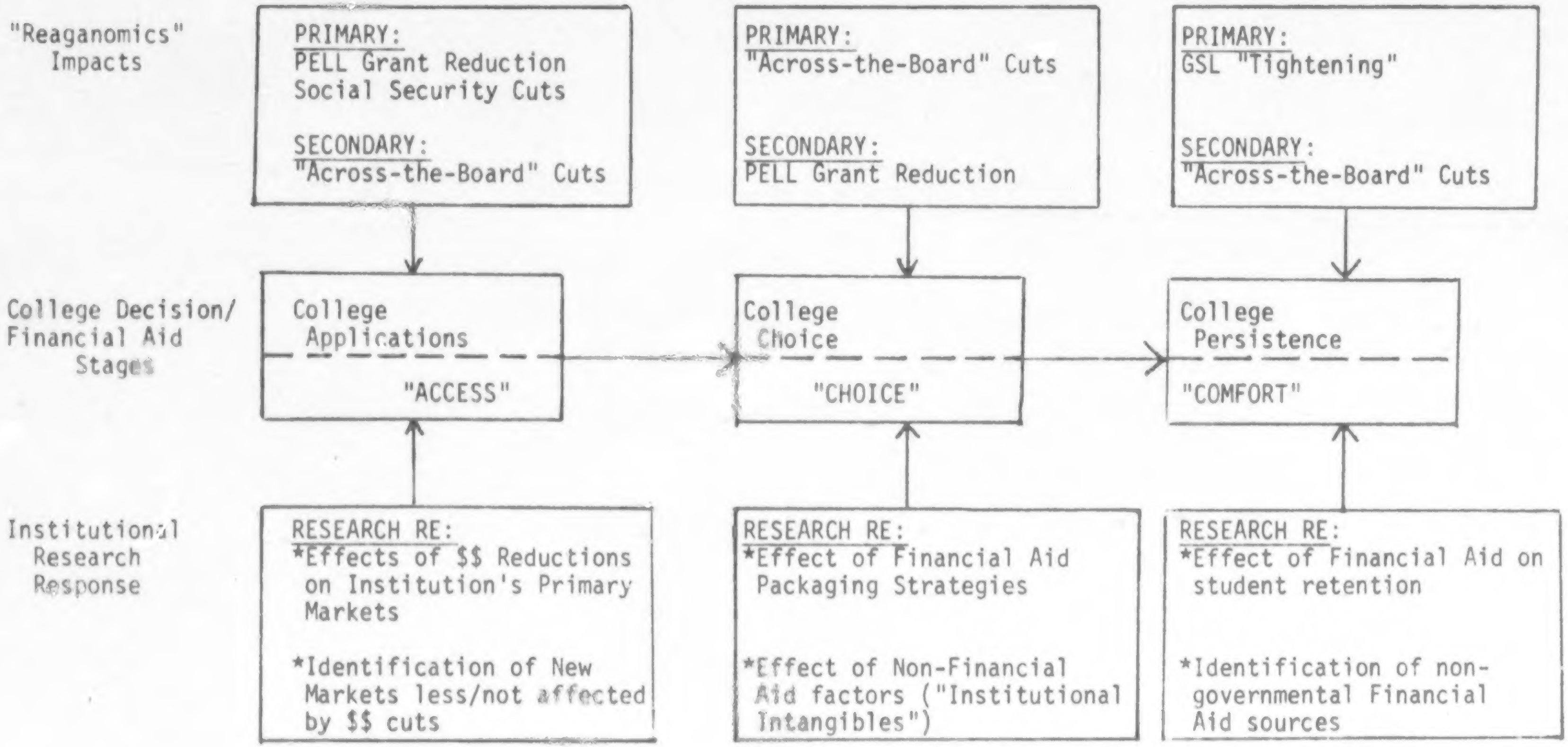
If an institution has not already done so, a comprehensive market study should be undertaken. While such a study will provide a better understanding of the primary market, it will also help to identify alternative/"non-traditional" markets from which the institution might draw. If, for example, a program of study would draw students from within private industry, the institution might find employer-reimbursed tuition to be an unexpected but SIZABLE financial aid source. At the same time, institutions should study pricing policies and positioning policies. As important as it is to know your applicant pool, it is equally important to identify and understand your competition.

Studies must be undertaken to establish those factors which most directly affect a student's decision to attend your institution. With or without the federal cuts, financial aid will quickly emerge as an important factor. A detailed analysis of the financial aid factor should involve a careful study of "packaging" strategies. Again, the question of "who" must be asked in regard to the allocation of aid. While need-based "packaging" policies can be maintained, the combination of types of aid within the "package" can be modified. Even a limited number of institutional scholarship/grant dollars could have a major impact if they are appropriately allocated. Beyond financial aid, other factors affecting enrollment decisions should be looked at and evaluated. Institutional image and reputation, on-campus and in "the marketplace;" particular programs of study; and geographic location, are a few "institutional intangibles" which could be identified as important factors; only careful study will indicate which if any are of crucial importance.

As previously suggested, new studies must also be done to determine/anticipate the impact of "Reaganomics" on retention. Students presently dependent upon federal financial aid will face cutbacks for the 1982-83 academic year. If students themselves are not yet aware of the cuts, institutions should make them aware so that steps can be undertaken now to investigate and develop alternate funding sources. At the same time, institutions must be able to evaluate and anticipate the impact of impending cuts on enrolled students. Again, depending upon an institution's student pool/profile, the impact on enrollment and retention could be significant. As pressures build to "get a class" and to "keep a class" difficult institutional policy decisions will have to be made. If reduced financial aid is targeted for the applicant pool, or if funding is committed to offset the increased needs of continuing students, the institution will have to understand and plan for the impact of either decision on total enrollment.

As federal budget-cutting initiatives continue, the challenge facing postsecondary institutions will be to do more with less. From "access", "choice" and "comfort", the focus has shifted to "innovation" in the postsecondary educational financing process. To the extent that students and institutions will persist in the 1980's, institutional research and institutional response to "Reaganomics" will be of the utmost importance.

MODEL of "REAGANOMICS" IMPACT/RESEARCH RESPONSE by COLLEGE DECISION/FINANCIAL AID STAGE



"Reaganomics" Impacts

PRIMARY:
PELL Grant Reduction
Social Security Cuts

SECONDARY:
"Across-the-Board" Cuts

PRIMARY:
"Across-the-Board" Cuts

SECONDARY:
PELL Grant Reduction

PRIMARY:
GSL "Tightening"

SECONDARY:
"Across-the-Board" Cuts

College Decision/ Financial Aid Stages

College Applications
"ACCESS"

College Choice
"CHOICE"

College Persistence
"COMFORT"

Institutional Research Response

RESEARCH RE:
*Effects of $$ Reductions on Institution's Primary Markets

*Identification of New Markets less/not affected by $$ cuts

RESEARCH RE:
*Effect of Financial Aid Packaging Strategies

*Effect of Non-Financial Aid factors ("Institutional Intangibles")

RESEARCH RE:
*Effect of Financial Aid on student retention

*Identification of non-governmental Financial Aid sources

Joyce/Joyce/11.6.81

INSTITUTIONAL RESEARCH AND ACCREDITATION AT THE DEFENSE INTELLIGENCE SCHOOL

Hugo A. Keesing
Director, Institutional Research & Planning
Defense Intelligence School

The Defense Intelligence School (DIS) is a federal degree-granting institution that offers unique professional education programs for military and civilian personnel assigned to intelligence functions. It has been in existence since 1963 and is currently a Candidate for Accreditation with the Middle States Association of Colleges and Schools. One result of embarking on the accreditation process was the identification of the need for, and establishment of, an institutional research (IR) program.

Like approximately 50% of higher education institutions in the D.C. and Maryland area enrolling 1500 or more students, DIS was without an IR program in 1980 (Marquis Academic Media, 1979). Planning was done, of course, since budget and manpower requests had to be made in accordance with the federal government's PPBS requirements. However, planning was isolated. It was less a projection of the School's mission and goals than a once a year effort to stay ahead in the game; to avoid shortfalls and get as large a piece of the pie as possible. Planning made minimal use of systematically accumulated data.

At many schools, external pressures for accountability have been the major impetus for IR. Whether it be related to (e.g.) use of resources or compliance with various statutes, accountability has been imposed on higher education by governmental agencies, state boards, tax payers, regents and others. The acknowledgment of a need for IR at DIS, as mentioned earlier, can be traced to its decision to seek accreditation.

An initial Middle States requirement for schools wishing to become

Candidates is that they submit for review a detailed Planning Document. In the preparation of that document, it quickly became obvious that there were some major shortcomings in record keeping, reporting and evaluation. For example, enrollment statistics kept by the Registrar did not always agree with those listed in the School's annual report. In some reports faculty loads were reported as "student man years" while in others they were given as "hours of platform time." Since different individuals in separate branches had responsibility for the reports, it was extremely difficult to arrive at a single meaningful statistic. The lack of human resources to evaluate the impact of School policies led to another set of problems. To provide military services with a high degree of flexibility in when they can send their personnel to DIS's degree program, the School permits students to enter at the beginning of any of the four academic quarters. However, the cost to staff and faculty is great. Core courses have to be taught every quarter, sometimes to only three or four students, much to the displeasure of already overloaded faculty. The admission policy causes scheduling difficulties and hardship for the students who miss the orientations which are only given in September and March. All three problems reflect a lack of centralized planning and coordination and might have been avoided if there had been an IR office.

The lack of an IR office has been detrimental in other ways too. Four years ago DIS went out on contract for three studies. The first was to develop a procedure for selecting new intelligence analysts. The School hoped to identify learning objectives for analyst education and training. A second contract was to develop selection procedures for military attaches and staffs. The third contract was awarded to gather detailed information on the manner in which military intelligence jobs are performed. The job analysis was to determine what tasks constitute individual jobs and what performance standards were necessary for job success.

There is no corporate memory of the first study ever being completed. If it was there is no record of it. The second study was aborted before it could get underway. Only the third, the job analysis, was carried out. It was ambitious in scope, involving 1451 respondants who each answered 473 questions. More than 260 of the subjects were DIS graduates, so the School had high expectations for a return on its investment. As it turned out, however, data were collected and reported in a way as to be almost useless for curricular refinement or modification. In short, DIS cannot act on what it learned so the study has been "filed and forgotten."

While the lack of in-house IR capability, with its greater accountability, was a contributing factor to the "failure" of the studies, another factor may have inadvertently hindered the job analysis. Current IR nomenclature may be part of the problem. The job analysis was regarded as a "follow-up." This suggested that it was the end point of a process, not the midpoint of an ongoing endeavor. The conceptual model for the study was linear; the summary of the thousands of pages of computer printout was the last step. There was apparently no plan on how the data were to be used. Not surprisingly, the wrong questions were asked for the data to feed back into a cyclical process of planning and change.

These examples, and others, prompted DIS to establish the position of Director, Institutional Research & Planning with responsibilities that include:

- preparing internal and external statistical reports;
- planning and implementing evaluation and outcome studies;
- organizing and directing accreditation efforts;
- assisting in establishment of long and short-range institutional goals;
- providing input for educational policies and procedures.

In its first six months of existence, IR has not always been welcomed with open arms. It has had to overcome both suspicion and hostility. The reasons for its sometimes cool reception are not surprising. Preparation of the Planning Document pinpointed weaknesses which were included in that paper's "Areas for Improvement" section. Defects in an organization generally point the finger at one or more people who have not been doing their job, whether that be formulating or carrying out policy. To those individuals IR is a threat. It is also a threat to the territoriality of people who previously had exclusive power in areas of School functioning.

On the part of faculty, there is a pervasive feeling that IR makes extra work; that it perpetually requests data and sends out questionnaires. Part of the resistance is the mentality that reporting is a one-time thing, not a regular on-going process. Data flow at the School is linear, something along the lines of, "You ask me to account for my time--I do so for nine months--you now have the information you asked for--don't bother me again." The most frequent faculty complaint is, "We've done/answered that before."

However, there is also another side to the coin. When IR produces, it runs the risk of becoming a panacea for all a school's problems. For example, the DIS Planning Document was apparently well-received since Middle States granted the School Candidate status. That favorable verdict did much to dispel scepticism. In fact, it helped to establish the IR director as an instant expert on the School, qualified and able to tell any number of people what their next course of action should be. The belief that IR can solve all problems is, of course, unwarranted. Institutional research is a tool that can contribute input to planning and decision making. It is not, and should not be asked to be, a policy making function.

One reason IR runs the risk of becoming a universal solution is the current infatuation with outcome studies. An area neglected by academia for years (Kells, 1980), such studies are now being undertaken in large numbers. Kells notes that the design and execution of such research has often been poor, and that it has not led to a "systematic, cyclical, useful evolution of...institutions' programs" (p. 8). Instead of being means to an end, outcome studies have become ends in themselves.

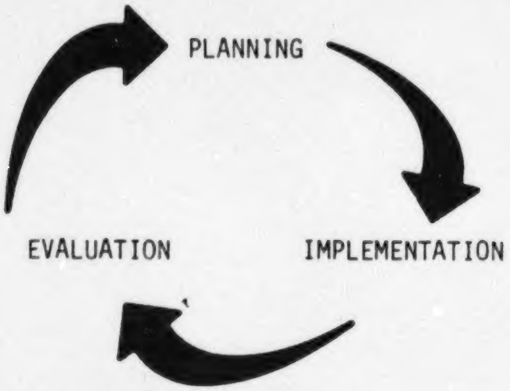
At DIS, student critiques, a type of outcome study, are collected for every course. Their use in reshaping curricula and affecting instructor behaviors is minimal. Most faculty members comply with School policy that their courses be evaluated. However, very few ever look at the data which are generated before they teach their courses again. At the risk of belaboring a point, the difficulty goes back to linear thinking. Critiques are regarded as the final requirement of a course, not as part of a continuous cycle of teaching, evaluation, change, and teaching.

Neither military organizations nor educational institutions have impressive track records when it comes to using sound management practices. The former frequently substitute "command decisions" for research and planning. The latter, despite their role as society's major agent for change, are among the worst practitioners of what they teach. Military educational institutions, therefore, are particularly unlikely places to exhibit an effective, systematic approach to self-evaluation and planning. Because of this, pursuing accreditation is an important and valuable experience for DIS.

The lessons learned so far are many. Two key statements emerged from the Middle States visitors' assessment report received by the School following a site visit last April. The report stated, "It is extremely important that DIS become more involved with long range planning...so that sequential action may be consistent and effective." The report went on to say, "The Middle States requirement of intensive self-analysis and further planning... should result in a clearer delineation of elements of its (the School's) complex mission and provide continuity of commitment both within the supportive agencies and the institution itself" (Brown, et al, 1981). Both statements direct the School away from a linear model of thinking and managing to a circular one like the "management wheel" (Mackenzie, 1969). A simplified version of the wheel (see Figure 1) shows that planning, implementation and evaluation follow one another sequentially. Institutional

Figure 1

Representation of Sequential Action Model



After Mackenzie, 1969.

research is the key ingredient of the self-analysis process required of Candidate institutions. It will dominate the "evaluation" portion of the sequential action model and be indispensable to the planning process.

One point that may not be immediately obvious from the representation but should be from its title is that for IR to be effective it must be followed by action. Action can take such forms as new or amended policies and procedures, reorganizations, or shifts in responsibility/authority. If the object of IR is not just to "report" but to "study," outcomes must be visible. Successful IR requires faculty and staff cooperation and good will. To receive the backing it needs, IR must be able to demonstrate what it is accomplishing. At DIS, such feedback is a major priority. There was some faculty grumbling when the IR office asked each instructor to project his/her total workload for the coming year. Anxiety over how the data would be used was allayed when the Dean reported that new faculty positions would be used to distribute instructional time more equitably. Precisely because IR can have a major impact on various areas of school functioning, personnel potentially affected should have both input and feedback on such research.

In summary, there are a number of lessons which have been learned in the past six months. In no particular order these include:

1. Accreditation is an extremely useful process for identifying the need for IR. Its reporting requirements can provide the leverage that may be needed to establish an IR office.

2. IR's contribution to educational management will not be realized until a sequential action model replaces a linear one as the standard for operating.

3. Successful IR can bring problems as well as rewards. The results of objective research can bruise egos, suggest unpopular courses of action or otherwise disturb the status quo. It can also improve effectiveness and quality, and dispel fears.

4. To achieve and retain credibility, IR must be followed by action. When information is gathered or statistics are analyzed, something must

result. Action can take the form of change, or of affirmation that all is well or on track.

5. Good public relations (PR) are an important ingredient of successful IR. Providing justification for request for information, and feedback on research findings, will make the relationship between the person directing IR and other personnel at the school one characterized by cooperation and trust.

6. Finally, IR is best "sold" in the context of "minimum expectation." It is best to promise less than can probably be delivered. Too often it is tempting to overestimate the impact or importance of IR. People unsophisticated about data analyses tend to overvalue statistics. Spelling out the limits of IR efforts will help insure that it is viewed as a tool, not a cure-all.

REFERENCES

Brown, A.W., Glickman, H., and Kirkwood, R. Assessement visitors' report to the Defense Intelligence School. Washington, D.C., April 1981.

Kells, H.R. Self-study processes: A guide for postsecondary institutions. Washington, D.C.: American Council on Education, 1980.

Mackenzie, R.A. The management process in 3-D. Harvard Business Review, November/December 1969, pp. 80-87.

Marquis Academic Media Yearbook of higher education (11th ed., 1979-80). Chicago: Marquis Who's Who, Inc., 1979.

INSTITUTIONAL RESEARCH WITHOUT A COMPUTER - STUDENT CHARACTERISTICS: COLLECTION, ASSIMILATION, AND APPLICATION

Kathleen A. O'Rielly
Assistant Director, Institutional Research and Planning
Mount Aloysius Junior College

What group is the most essential to a College community? Take an informal survey on any campus. The faculty will insist that they as conveyors of knowledge are most important. Administrators will stress the importance of good leadership and direction. Support staff would suggest operating without them only to discover that communication ceases as do order, cleaning, and food services. Students would assert that without a student body the College would have no mission, and correctly so. Students, as a college's most important product, provide a focus for student characteristics, the keystone of an institutional research program.

An institutional research study, e.g., student characteristics, involves three steps: collection, assimilation, and application. The procedure omits programming, keypunching, encoding and analyzing computer printouts.

Facilities, which at first glance seem limited in the absence of any computer capability, are in fact limitless. Student characteristics cross all campus boundaries as the prime interest group which affects Academics, Student Services, Finance and Physical Plant. Each area impacted may provide data to the institutional researcher.

Collection, the first phase of institutional research, involves contacting primary campus offices with student information files (e.g., Admissions; Registrar; Academic Dean; Student Services; Financial Aid; Campus Ministry; and Student Counseling).

Admissions, the first logical area for collection as it serves as the student's initial contact with the College, gathers applicant data (high school records: grade point average; rank in high school class; intelligence quotient test scores; Scholastic Aptitude Test scores or American College Testing scores; and other demographics).

The Registrar's office often maintains a data collection for mailings and government reports (e.g., HEGIS) and generally may supply the researcher with the age, sex and race (minority quota) of the students. In addition, the Registrar reports each student's hometown, high school (public or private), College score on entrance examinations (e.g., CGP), College quality point average, and academic program.

Stop at this preliminary stage of collection and review the data. What are you missing? What else do you need to know to form a complete profile of the Student Body?

The Financial Aid office may best provide more student demographics. Also responsible for government reporting, Financial Aid gathers a multitude of student information. Request from Financial Aid student family income in ranges (the number and percentage of students with family incomes under $12,000; between $12,000 and $20,000; and more than $20,000), the College's student mean family income, total financial aid recipients, and the amount (total dollars) of loans and grants by funding source. The Academic Dean's office may provide (missing) information as to honored (Dean's and President's List) students by academic program.

Follow the student's path to the next most logical area (for collection): Student Services. At most colleges, the Housing and Campus Ministry offices report to the Dean of Students. Consider the amount of time that students participate in extracurricular activities, relax in the dormitories, and eat in the cafeteria. Request from the Dean of Students all available student information: percentage of commuting and resident students (the number of students who live in co-ed; single-sex; married student housing; and the number in off-campus housing); the number of students involved in activities; sports team players, and activity-related scholarship information not supplied by the Financial Aid Office.

Also, meet with Campus Ministry, Housing, Student Activities, and Counseling staffs. What student information can they provide? And, more important, what service can you furnish to them as a researcher?

At this stage of data collection, reassess all available information. What else is necessary in order to present a true and complete profile of the Student Body, a student prototype? Consider the primary source: the students. A student characteristics study coupled with student perceptions (gleaned through surveying) yields a more complete student portrait.

A few considerations in surveying: request the information lacking in student characteristics collection: religion (provide an optional one-page checklist); marital status (if not available from Registrar); and student perceptions (ask several open-ended questions: College's strengths; weaknesses; and "if you had it to do all over again, would you return to ABC College?").

Through assimilation, the on-campus data gains perspective in light of national and regional comparative statistics (gleaned from publications by such agencies as The College Board; The National Center for Education Statistics; and The American Council of Education). The College Board prepares annual reports free of charge summarizing the characteristics of high school students, e.g., SAT scores; student finances; high school rank and G.P.A.; minority quota; quotient from public and private high schools , providing regional and national comparative data. Other resources include the American Council on Education (ACE) Fact Book; National Center for Education

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Statistics (NCES) publications; current issues of Higher Education and National Affairs (an ACE weekly); and issues of The Chronicle of Higher Education. Maintain clippings files from metropolitan newspapers and magazines for current comparative statistics.

The College Board library in New York and The National Center for Education Statistics office in Washington, D.C., and State archives librarians are most helpful and approachable by mail; or phone call for immediacy.

In successive studies, the researcher may gather many assimilation materials during the collection stage. The offices initially approached for data will subsequently regularly supply the researcher with updates when available. Admissions may receive statistical updates, and will collect copies of SAT and ACT reports.

In reference to SAT and ACT scores, the Table of Concordance correlates ACT scores with SAT averages by sex. At a small, private college, in which less than 10% of the students submitted ACT scores, the research office chose to disregard ACT scores and reported only SAT averages. For larger schools, with greater numbers of ACT reports, the researcher may choose to report averages for both ACT and SAT scores. Also, schools which require specific achievement tests may wish to collect and report the scores by academic program for annual comparison.

Consider making an annual comparison of nonenrollers versus enrollers by College Board (or ACT) scores, high school rank, and by academic program. Do higher or lower calibre students register at the College, and in which academic program(s)?

An associated study may compare persistors and nonpersistors. Collect information from the Registrar, Academic Dean, Dean of Students, and where appropriate, the Counseling center. Similar data from the Housing Office may construct a study of resident students, i.e., who remains on campus; moves off campus; dormitory dismissals; and academic dismissals which result in resident hall attrition). Many research studies provide national comparisons of attrition and (the desired effect) retention rates.

Similar to the final step in collection, review comparative data assimilated and discern other information needed. Contact academic department chairmen for comparative curricular studies, e.g., Annual Reports and student performance on national testing, and don't neglect program directors, who by the nature of their roles collect student information.

Application involves the composition and analysis of all research into published reports for general campus information and as the basis for institutional self-study for accreditation appeals.

One major Student Characteristics Study may chart the evolution of a student body via the changing nature of the incoming freshman class annually for a decade. Each characteristic comprises one chart which depicts the College's freshmen (e.g., by age) versus counterparts at other colleges nationally and within a geographic area, i.e., College Board statistics for all United States college students; Northeast region; two and four-year public and private colleges. Sample charts include demographic information (e.g., number and sex; minority students; marital status; students by Age Groupings; Religion; Financial Characteristics; High School: Public or Private; High School Rank vs. Two and Four-Year Public and Private Colleges).

Academic data may include such charts as SAT scores ranked for the decade; all U.S. colleges SAT ranked; all U.S. colleges vs. ABC College; SAT scores at two and four-year public and private colleges vs. ABC College. Rank College Board scores and Quality Point Averages by curriculum and by class (e.g., Freshmen vs. Sophomores). Cross-comparisons of high school class rank, SAT scores, QPA, and enrollment make interesting further studies.

One hypothesis tested at Mount Aloysius Junior College throughout the decade of the 70s correlated a fall in the SAT average with a rise in enrollment and an associated rise in the SAT average as enrollment decreases (i.e., more selective admissions).

Other possible studies include annual updates of the student study (with or without an accompanying survey of student perceptions). A complete study of the reasons why students withdraw from the College, an Attrition Study, compiles information collected from the Registrar, Academic Dean, Dean of Students, and Counseling Center concerning when students withdraw (month/semester), status (Freshman; Sophomore) academic program (report program attrition levels as a percentage of program enrollment), and reasons for withdrawal (personal: financial; change of status, or academic: school-imposed; student-initiated). Comparable to nonenrollers, nonpersistors as a group make an interesting comparison with persistors (enrolled students).

In conclusion, using the three steps: collection, assimilation, and application, institutional research may occur without a computer.

The enclosed memorandum, 1980-81 QPA's BY ACADEMIC PROGRAM exemplifies a student characteristics study. The collection originated in the Registrar's office with semester progress reports by academic program for freshmen, sophomores and the total college. To assimilate the 1980-81 information, fall, 1979 data served as a base year, taken from the 1970-1979 Student Characteristics Study. Application resulted in a report, requested by the (funded) project directors, distributed to all campus leaders to illustrate the shifts in performance from the fall to spring semester in a given academic year.

Mount Aloysius Junior College
Cresson, Pa. 16630
(814) 886-4131

TO: College Leaders

FROM: Kathleen O'Rielly KOR
Assistant Planning Director

SUBJECT: 1980-81 Q.P.A.'s BY ACADEMIC PROGRAM

DATE: August 19, 1981

Requests from several Project Directors for comparative data on academic programs from fall to spring semesters using fall, 1979 as a base term, academic averages are listed by academic program for the college, freshman, and sophomore classes for fall, 1980, spring, 1981, and the change over the year.

The Mount Aloysius Junior College quality point average (Q.P.A.) rose .1 from 2.8 in fall, 1980 to 2.9 in spring, 1981 (the fall, 1979 average). During 1980-81, the freshman class average increased .2 from 2.7 in the fall to 2.9 in the spring, while the sophomore average held constant at 3.0 for the entire 1980-81 academic year (up .1 from 2.9 in fall, 1979 when the freshman average was 2.8).

One-half (eight) of the academic programs increased its Q.P.A. from .1 to .5 (Medical Assistants increased from 2.9 to 3.4 in spring, 1981). The remainder either remained constant (Executive Secretarial students averaged 3.1 in 1979, 1980, and 1981) or declined .1 or .2.

Among freshmen the change reflected a pronounced improvement in 11 of the 16 departments, as high as .8 (General Studies 2.0 to 2.8) and .9 (Medical Assistants (.9 from 2.3 to 3.2). Only Freshman Nursing students reported a decline .2 from 3.1 to 2.9, while four curricula maintained their fall averages.

Sophomores overall did not shift in academic performance from fall to spring terms, although eight program averages dropped from .1 to .5 (Liberal Arts from 3.2 to 2.7). Five programs raised in averages from .1 to .3 (Business Administration and Gerontology), while two departments maintained standard Q.P.A.'s fall and spring semesters (Human Services and Nursing).

The following charts display the fluctuations by department and class. Further study might consider a department's deviation from the mean in its shift during an academic year. Comparisons of a department's progress might track a group (e.g., freshman art students) through its history at the college (i.e., how the 1979 freshman art students perform as 1980 sophomore art students).

In closing, this brief summary does not pretend to offer critiques, solutions, or detailed analysis, but merely, reports the available information.

MOUNT ALOYSIUS JUNIOR COLLEGE 1980-81 ACADEMIC PROGRAM

QUALITY POINT AVERAGES

		ACADEMIC YEAR 1980-81		
PROGRAM	FALL 1979	FALL 1980	SPRING 1981	CHANGE
ART	2.8	2.7	3.0	+.3
BUSINESS ADM.	2.8	2.8	3.0	+.2
CRIMINOLOGY	2.9	2.6	2.5	-.1
DATA PROC.	2.9	3.2	3.3	+.1
EXEC. SEC.	3.1	3.1	3.1	---
GENERAL STUDIES	2.3	2.3	2.4	+.1
HUMAN SERVICES	2.5	2.3	2.2	-.1
GERONTOLOGY	2.7	3.6	3.7	+.1
LEGAL SEC.	2.8	2.7	2.9	+.2
LIBERAL ARTS	3.2	2.8	2.7	-.1
MEDICAL ASST.	2.9	2.9	3.4	+.5
MEDICAL SEC.	3.3	3.4	3.2	-.2
MERCHANDISING	2.9	3.0	2.9	-.1
MUSIC	2.8	2.8	3.0	+.2
NURSING	2.8	3.2	3.1	-.1
O. T. A.	3.2	3.2	3.0	-.2
COLLEGE AVERAGE	2.9	2.8	2.9	+.1
		FRESHMAN QUALITY POINT AVERAGES		
ART	2.9	2.7	3.2	+.5
BUSINESS ADM.	3.0	2.9	3.0	+.1
CRIMINOLOGY	3.0	2.3	2.5	+.2
DATA PROC.	2.9	3.2	3.3	+.1
EXEC. SEC.	3.3	2.9	3.1	+.2

PROGRAM	FALL 1979	FALL 1980	SPRING 1981	CHANGE
GENERAL STUDIES	2.3	2.0	2.8	+.8
HUMAN SERVICES	2.2	1.9	1.9	---
GERONTOLOGY	2.2	3.8	---	---
LEGAL SEC.	2.7	2.3	2.6	+.3
LIBERAL ARTS	3.6	2.4	2.8	+.4
MEDICAL ASST.	2.8	2.3	3.2	+.9
MEDICAL SEC.	3.5	3.3	3.3	---
MERCHANDISING	3.0	2.7	3.0	+.3
MUSIC	3.0	2.5	3.1	+.6
NURSING	2.8	3.1	2.9	-.2
O. T. A.	3.2	3.0	3.0	---
FRESHMAN AVERAGE	2.8	2.7	2.9	+.2
		SOPHOMORE QUALITY POINT AVERAGE		
ART	2.7	2.6	2.8	+.2
BUSINESS ADM.	2.7	2.7	3.0	+.3
CRIMINOLOGY	2.8	2.8	2.5	-.3
EXEC. SEC	3.1	3.2	3.1	-.1
GENERAL STUDIES	2.5	2.5	2.1	-.4
HUMAN SERVICES	2.7	2.6	2.6	---
GERONTOLOGY	2.9	3.4	3.7	+.3
LEGAL SEC.	3.3	3.0	3.2	+.2
LIBERAL ARTS	2.3	3.2	2.7	-.5
MEDICAL ASST.	3.1	3.5	3.6	+.1
MEDICAL SEC.	3.2	3.5	3.2	-.3
MERCHANDISING	2.8	3.3	2.9	-.4
MUSIC	2.7	3.0	2.9	-.1
NURSING	3.0	3.3	3.3	---
O. T. A.	3.3	3.3	3.1	-.2
SOPHOMORE AVG.	2.9	3.0	3.0	---

REFERENCES

American Association for Higher Education, One Dupont Circle, Suite 780, Washington, D.C. 20036 (202) 293-6440, Publishes *AAHE Bulletin* monthly except July and August, $20 a year for nonmembers.

The American Council on Education, Suite 800, One Dupont Circle, N.W., Washington, D.C. 20036, Publishes *Higher Education and National Affairs* weekly except at Easter, July fourth, the month of August, Thanksgiving and Christmas, $30 a year for nonmembers.

The Chronicle of Higher Education, Post Office Box 1955, Marion, Ohio 43302, Published weekly except the first three weeks in August and the last three weeks in December, $32.50 a year.

College Entrance Examination Board (publications) New England Regional Office, 470 Totten Pond Road, Waltham, MA 02154 (617) 890-9150, Middle States Regional Office, Suite 1418, 1700 Market Street, Philadelphia, PA 19103 (215) 567-6555.

College Scholarship Service, The College Board, 888 Seventh Avenue, N.Y., N.Y. 10019, Research Division: (212) 582-6210

Comparative Guidance and Placement Program, (CGP), Box 2869, Princeton, N.J. 08541, Provides tests and other educational programs and services as a program of the College Board.

Education, Department of Harrisburg, PA, Research Division: (717) 787-5041

Education, Office of, Washington, D.C., Research Division: (202) 245-2806

National Center for Education Statistics, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Publishes The Condition of Education, an annual statistical report.

National Center for Higher Education Management Systems, Inc., Boulder, CO 80302, Publishes variety of statistical reports and research publications, including A Manual for Conducting Student Attrition Studies.

INSTITUTION-BASED INTERINSTITUTIONAL RESEARCH
BOON OR BURDEN

Dwight S. Wolf
Director of Institutional Studies
Union College

The institutional researcher is a newcomer to the field of American higher education. Thus, while activities that we now associate with institutional research certainly were taking place in 18th century colleges, it has only been since about 1960 that institutional research has existed as a recognized field of endeavor (Dressel, 1972, p.15). Witness the fact that the Association for Institutional Research has existed only since 1965 and that this is but the eighth annual conference of the North East Association for Institutional Research.

Likewise, interinstitutional research only recently has emerged as a recognizable subspecialty within the institutional research field. Marvin Peterson defines interinstitutional research as:

> ...studies which focus on the characteristics or dynamics of the whole institution (or major segments of it) as the unit of analysis and examine them in relation to those characteristics or dynamics in other institutions (or segments of them) (Peterson, 1976, p.viii).

While these activities have come into vogue only in the past decade or so, they have many antecedents. For example, the field of comparative organizational research is hardly a new one in the areas of political science, economics and business, or sociology. Furthermore, long before the term "interinstitutional research" was coined to describe the activity, the federal government was gathering data on institutions of higher education. In fact, the Office of Education has been doing so since 1867.

The Growth of Interinstitutional Research

Now, however, interinstitutional research seems to have come into its own. Texts on the subject of institutional research generally contain a chapter on interinstitutional research, even if it is not identified as such (Dressel and Pratt, 1972). In 1976 Jossey-Bass published a volume solely devoted to interinstitutional research (Peterson, 1976). According to both Paul Dressel (Dressel and Pratt, 1972, p.292) and Marvin Peterson (Peterson, 1976, pp.viii-ix) interinstitutional research now is being conducted by a host of organizations. Some of these include: federal agencies like the Department of Education through the National Center for Educational Statistics; national associations such as the American Association of University Professors and the American Council on Education; regional agencies such as the Southern Regional Education Board, the Western Interstate Commission for Higher Education, and the many regional accreditation bodies; state coordinating boards; research groups ranging from the Carnegie Commission on Higher Education to the Educational Testing Service; and finally, numerous individual researchers (interestingly, neither author mentioned such research being conducted by college offices of institutional research -- the subject of this paper). Over the last few years institutional researchers have become quite interested in much of this interinstitutional research. Why?

The answer to this question involves the same reasons given for why there is a growing demand for institutional research. Dressel has tried to explain this trend by stating that:

> Higher education has become a very large enterprise, much too complicated to be run on improvisation guided by expediency, opportunism, and competition (Dressel, 1972, p.15).

The apparent acceptance of this opinion by a growing number of decision-makers in higher education

> ...bears out the conviction that choices and decisions based upon extensive knowledge and evidence are better than those made without knowledge or evidence (Dressel, 1972, p.xi).

This, perhaps, explains why the demand for institutional research has increased so dramatically over the past two decades.

At the same time that increased institutional complexity has led administrators to turn to their offices of institutional research for data and analyses, Peterson has noted the increased pressure to justify decisions and to show that these decisions are efficient and cost-effective (Peterson, 1976, p.ix). Accountability has become one of the watchwords of higher education. As Dressel has pointed out, very often institutional research has little meaning unless it is compared with similar data from other institutions (Dressel, 1972, p.28). This seems particularly true in fiscal areas, hence the great demand for interinstitutional data with respect to faculty salaries and tuition levels.

It would seem that college administrators have responded in the affirmative to the rhetorical question posed by Peterson:

> Does the comparative study of institutional characteristics provide better bases for decision making than research that deals only with internally generated data? And is interinstitutional research likely, then, to make our higher educational institutions more effective (Peterson, 1976, p.x)?

This rush to ascertain how one compares with other institutions in almost any area that seems remotely comparable has not occurred without problems and concerns.

Problems

On the theoretical side, some hold that institutions of higher education are unique entities and therefore cannot be compared. This view is related to the concern that the growing tendency to base decisions at least partially upon interinstitutional comparisons could lead to homogeneity (Peterson, 1976, p.x). If one accepts that a strength of American higher education is its diversity, then this concern seems legitimate. In a more practical vein, there are those who argue that institutions of higher education are so complex that they cannot be compared, even using multivariate comparisons (Peterson, 1976, p.102). Finally, it does appear that the demand for yet another layer of analysis prior to decision-making may result in inordinate delays in these decisions.

For the institutional researcher, the increased demand for interinstitutional comparative analyses has created two problems. First, the already burdensome requests from the various groups that Dressel and Peterson have identified seem to have multiplied as comparative analysis has come into vogue and as government agencies seek to obtain more and more data. Institutional research offices now spend untold hours responding to these requests; requests which often are complicated by definitional problems. This task would seem less burdensome, or at least more worthwhile, if these studies and data compilations were of use to institutional research offices. This, however, generally is not the case.

The second problem that the institutional researcher faces is that of responding to requests for interinstitutional analyses from within his or her institution. The solution, seemingly, is to make use of the research produced by the various government and private groups to which one has been providing data. However, when one has become familiar with what is available (no mean task in itself, given the mounting volume of such material), several shortcomings are noted.

For one thing, much of the research carried out by these various groups really is not interinstitutional research at all. Rather, as Dressel has noted, it is the study of the field of higher education (Dressel, 1972, p.22). This is particularly true of the research carried out by individuals and by private groups. While valuable in its own right and clearly of interest to students of higher education, it is generally of little help to the institutional researcher who is trying to provide comparative data to decision-makers.

A second shortcoming of this research is its lack of timeliness. For instance, the comparative faculty salary data recently released by the AAUP covered the 1980-81 academic year. Data for 1981-82 will not be available until next summer. Yet, right now administrators are beginning to construct budgets for 1982-83 and they want comparative data on 1981-82 faculty salaries; data that will not be available from the AAUP until next summer. In general, NCES data is even less timely.

There are several additional problems with this kind of interinstitutional research. Because it is generally collected on a state, regional, or national level, it often is not aggragated in ways that respond to an institutions particular needs. Or, the institutions sampled are inappropriate to provide meaningful comparisons. Finally, while perhaps dealing with the topic of concern to an institution, the research often is too general to provide the specific analyses needed. Let me give an example.

At Union we had become increasingly concerned about the condition of our physical facilities and our grounds. Each year the campus seemed to look a little worse. Lawns seemed more unkempt, buildings seemed in need of paint, it seemed ages had passed since the windows had last been washed, etc. You all know the story. Increasingly we began to hear the term "deferred maintenance". Not surprisingly, the College administration began to experience pressure from students, faculty, and Trustees to increase the budget of our physical plant operation in order to solve these problems. However, an ad hoc campus group formed to study the situation questioned whether finances really were the problem. How did our physical plant budget compare to that of other similar institutions? A good question. Upon investigation we discovered that there was a recent publication by a national association that was devoted solely to comparative physical plant data. About a month and $17.50 later we discovered that while interesting, that particular study neither contained the data we felt we needed, nor had it reported it in ways we felt were useful. Therefore, we decided to design and carry out our own interinstitutional study.

Institution-Based Interinstitutional Research

This is just one example of what is happening with increased frequency throughout higher education. Pressures for accountability and a recognition that decision-making in a complex environment requires sophisticated methods have resulted in increased requests for comparative data. Institutional researchers have discovered that the interinstitutional research produced by government agencies and national organizations often is unsatisfactory to respond to these requests. The outcome has been the proliferation of institution-based interinstitutional research.

An interesting development has resulted. Already asked to carry out institutional research and to respond for their institutions to data requests from the groups mentioned, institutional research offices now find themselves asked to conduct their own interinstitutional research. As research proves useful the demand for it grows. At times it almost seems that no decision can be made without comparative data. Such research is a two-edged sword. Institutional researchers now find themselves asked to respond to interinstitutional data requests from other institutions. While this development does not represent an intolerable burden, it is often made difficult by the quality of many of these requests. To be blunt, too many of these requests are based upon weak research designs and utilize poorly constructed research instruments that often are fraught with definitional problems. Since this generally results in low return rates and marginally useful data, one must assume that much of this research turns out to be of little real use. Worse still, such research creates unnecessary work for colleagues who try to cooperate with the information requests and, in general, gives all institution-based interinstitutional research a bad name.

What can be done to alleviate some of these problems? I would suggest that there are a number of things, some that involve the decision-making process, others the research process. Certainly, many instituional researchers already utilize these suggestions and for them the following comments will border on the tedious. On the other hand, I trust that there are those who will benefit from one or more of the suggestions that follow.

Strategies for Success

The first suggestion is by far the most difficult to implement. Before any study is undertaken, a careful determination should be made as to whether or not such a study will be helpful to the decision-making process and, concurrently, whether or not it will be used. While akin, these are two separate issues. The latter, of course, is an area over which the institutional researcher has very little influence.

Paul Dressel has noted:

> Often there is a reluctance to use the results of institutional research in decision-making because this does not allow 'seat of the pants' or emotional decisions (Dressel, 1972, p.20).

At the same time, however, decision-makers do not appear to be reluctant to request interinstituinal data. Because they face pressures to make well-informed decisions, as well as to justify these decisions, administrators often request interinstitutional data for political reasons. About all that the institutional researcher can do is point out the costs associated with such research efforts and then trust that the college's decision-makers will not make needless demands for data they probably will not use.

The institutional researcher can, however, help ascertain whether or not the data that have been requested will be helpful to the decision-making process and will be worth the effort expended. It must be remembered that most college administrators have little understanding of the work that may be required to satisfy their information requests. The need for well-informed decisions has made requests for interinstitutional analyses almost routine. Often, these administrators assume that the data they have requested can be furnished quickly from publications on hand. Thus, where this is not the case it is important, as Peterson has pointed out, to inform them that

> ...original data collection in multi-institutional settings can be expensive; and the time required both to manage the participation in and to conduct one of these projects ... [can be extensive] (Peterson, 1976, p.105).

Administrators, then, should resist the impulse to acquire the data first and then afterwards to decide whether or not to use it. Institution-based interinstitutional research should be far from routine. Likewise, institutional research offices should avoid undertaking this kind of research for its own sake. Research conducted for its own sake may be more common (and more acceptable) within an institution where only one's own personnel are affected, but it is unacceptable when the personnel of other institutions are involved.

There is one factor which often is overlooked in determinations of the usefulness of interinstitutional research. Since most of this research involves comparisons among institutions, which institutions are included in the research study takes on great importance. If there is not general agreement that the institutions included are the appropriate ones, the research will probably go unheeded and will represent a wasted effort.

The selection of peer institutions seems to be one of those activities that can engender almost endless debate on a campus. Most of us are familiar with the classifications developed by the AAUP or by the Carnegie Council (AAUP, 1981 and Carnegie Council, 1976). These "threshold" models, as Terenzini has termed them, fall somewhere in the middle of a continuum that runs from the selection of peers based upon football opponents on the one hand (faculty salary data and comparisons for the "Big Ten" are available from the AAUP) to those chosen via a more scientific approach such as the "cluster analytic" model proposed by Terenzini, et al (Terenzini, 1980). Whatever the method used in the selection of peer institutions or the institutions selected, the decision will be both political and open to criticism. This should not preclude the selection of peer institutions, but it should point out that attempts to either select or change peer institutions will be fraught with controversy.

Simply because interinstitutional data is judged necessary to support the decision-making process, a separate interinstitutional study is not always necessary. There is a great deal of useful research being done; research for which you probably contributed data. The problem is in being aware of what is available. Now more than ever, the institutional researcher needs to keep abreast of developments in the field. Few things offer more embarassment than to design a study, send out the research instrument, and subsequently learn that the data you seek already has been collected and is readily available. On the other hand, preexistent data will need to be examined closely to determine whether or not it meets your needs. Is it aggragated in such a way as to be useful? Is it compatible with your data? Is it timely enough for your needs? Sometimes a little ingenuity can save you a separate study. For example, the AAUP's annual salary data provides adequate information for you to determine faculty distribution by rank at various institutions. Likewise, a little manipulation allows you to determine the average salary for senior faculty, a statistic that may be more relevant if your distribution among ranks is unusual.

Nonetheless, there will be those times when an institution-based interinstitutional study cannot be avoided. Are there certain strategies that can be followed that will result in a successful effort with a minimal burden both to your office and to the offices at institutions whose cooperation you need? Clearly, the answer is yes. Actually, many of these strategies are so simple that I almost hesitate to mention them for fear that you will be insulted or bored. Still, the number of research instruments that have crossed my desk that could have benefited from one or more of these strategies leads me to risk alienating those of you to whom this is "old hat".

Peterson has stated that to maximize participation in an interinstitutional research project it is necessary to define clearly the purpose of the research both with respect to its focus and its intended use (Peterson, 1976, p.102). I would add that this purpose should be fairly narrow or specific in nature. Studies whose purposes are unclear or that request a wide range of data because they have attempted to combine several purposes within one research instrument often are given a very low priority by those institutions that have been asked to cooperate.

Concomitantly, the research instrument should reflect this clarity of purpose. Instruments which are ambiguous or which attempt to gather data seemingly unrelated to the stated purpose of the research will languish on desks or be consigned to waste baskets. Specific purpose research instruments, on the other hand, will yield an increased return rate, more rapid responses and will make follow-ups easier because fewer persons will have been involved in their completion. Similarly, the instrument should be as concise as possible. As many institutional researchers know, there is an inverse relationship between the length of a research instrument and the rate of return one can anticipate.

I can think of three research instruments of twenty pages plus that have come to me in the past several years. Aside from the almost unimaginable length, all three suffered from a lack of clarity with respect to the goals of the research. The research instruments "covered the waterfront" in their information requests. After about eight hours of work on the first, I consigned it to the bottom of my pending basket. It stayed there until I finally threw it out. I never even started the second -- I just let it sit. I did manage to work my way through the third one, but it was returned about three months late. Where at all possible research instruments should be kept to a page or two. In a well-conceived research design meant to provide answers to specific questions, a research instrument of two pages or less should be possible most of the time.

Perhaps the major difficulty with interinstitutional research concerns definitional problems. Both Peterson (1976, p.104) and Saupe (1972, pp. 53-99) address themselves to this issue. Care should be taken in the construction of the research instrument so as to minimize such problems. In fact, the choice of which institutions to include in the study could be affected by this issue. Credit hour data from an institution on a quarter system may present difficulties if the rest of the sample is on the semester system. Likewise, salaries from institutions with no faculty ranks may be useless. Research instruments fraught with definitional problems will have a poor return rate, will necessitate time-consuming follow-up queries and may be of marginal use because of unresolved discrepancies.

The research we conducted on physical plant operations sought data on physical plant expenditures and on the size of the staffs. Only after the majority of the questionnaires had been returned did we discover that at about half of the institutions the campus security operation was part of the physical plant operation. This resulted in the need for follow-up calls to over half of our sample in order to clarify the data. Finally, research instruments that are designed to foresee and forestall definitional problems will reduce the number of "not usable" responses. This can be of significant importance to the validity of small-sample studies.

Since institution-based interinstitutional research will mean extra work for the institutions whose cooperation you need, there are several common courtesies that should be observed. Not only will the observation of these courtesies help the reputation of such research and perhaps make institutions more willing to cooperate again in the future, but they almost assuredly will result in a better return rate for your research instrument. First, a stamped, self-addressed return envelope should be provided. It has reached the point where I often discard requests that are not accompanied by this courtesy. Even if I do respond to them, I generally consign them to my pending basket for several weeks out of pique. Perhaps this is indicative of a certain childishness on my part. So be it. Since I am already providing my time and the time of my staff free of charge, I find it inconsiderate at best that I also am expected to supply an envelope and postage for a study that is not even mine. Almost as annoying are those requests which utilize 8½ x 11 inch paper, but have return envelopes that are only suitable for 5½ x 8½ inch paper. While better than no envelope at all, this practice presents an unprofessional appearance. While some may consider this whole issue trivial, I do not. I consider it both common sense and common courtesy.

Secondly, if there is any chance that your research may be of interest to the institutions you are sampling, offer to share your results. Often, as with most of the other suggestions that have been made, this will increase the return rate of your research instrument. If you couple this offer with a thoughtful presentation of the data, then not only will you be providing a useful service to your colleagues, but you will enhance the reputation of this type of research. For example, for some years now we have conducted a tuition, room and board survey at the behest of our Trustees who wanted comparative data earlier than it normally would be available from national sources. This survey is conducted in the early spring just after the rates for the following year have been set. In return for their cooperation we provide the participating institutions with tabulated results; results which allow them to know how they will compare with peer institutions with respect to tuition and other charges almost six months before the *Chronicle of Higher Education* publishes their report. Consequently, we have had a 100% return rate for years. Likewise, we shared the results of the physical plant/maintenance study I have referenced. Because our own needs were quite specific, because we felt we should try to provide data to respondents that might meet a number of needs, and because we had guaranteed anonymity to cooperating institutions if they wished it (the offer of anonymity is quite important and should be guaranteed whenever the data may be sensitive), we were forced to author two rather different reports. The favorable feedback that we received from many of the cooperating institutions leads me to believe that the extra effort was worthwhile. In fact, some of the institutions have now suggested that the study be updated. They must have found it useful.

A final nuts-and-bolts suggestion is that you allow adequate time for a follow-up mailing (it goes without saying that while follow-ups can be conducted via the telephone if they are uncomplicated, initial research should never be conducted over the telephone -- such a procedure inconveniences your colleagues and they may not have the data at hand). This will increase your overall return rate, especially if the cover letter that accompanies the follow-up request can tout the numbers and usefulness of the responses you already have received.

What will your research effort yield? Do not expect too much. First, it will not solve your problem, neither will it make any decisions for you. It may not even provide answers to specific questions that have been posed. The results may be ambiguous or your data may be skewed. In effect, your study may have found that there is no clear answer. In addition, you should be prepared to have research results that you feel are useful viewed in a different light by decision-makers. This relates to the earlier discussion regarding what data will or will not be helpful and what data will or will not be used. Political expediency may negate the effects of your study, no matter how clear the implications of the research to you.

Finally, I would suggest that not only should your data be analyzed from an objective standpoint, but also from a creative one. We are all aware of the need to resist those pressures that would try to have data gathered to refute or to support a particular case. To give in to these pressures may lead to challenges to your objectivity. These pressures are real and are faced by us all. With respect to creativity, while you are analyzing your data in response to the questions posed by decision-makers, be alert to the possibility of unexpected dividends. Let me explain. As I have mentioned, the physical plant/maintenance survey that we undertook was flawed by our failure to realize that many other institutions have their campus security operation within their physical plant organization. That was not the case at Union. In fact, these areas were administered by two different Vice Presidents. Maybe we were overly parochial or perhaps just not observant, but we were unaware that other institutions were organized differently. As a result of the study we decided to examine our structure. It was then decided that a reorganization would yield significant benefits and now both areas report to the same Vice President and are more closely coordinated than before. If the flaw in our study had not pointed out this structural difference (and the research instrument certainly had not been designed to examine this area) we might not have reorganized. I would label this result an unanticipated benefit.

Conclusion

With institutional decision-makers under pressure to make difficult decisions at the very time that decisions themselves are becoming increasingly complex and at a time when accountability is heard from all quarters, institution-based interinstitutional research is a growing necessity. As long as the need for such research is carefully considered, the research itself well conceived, and institutions are willing to share data, then such research will be a boon to decision-makers and an enjoyable challenge to institutional researchers. If, on the other hand, such research proliferates unnecessarily, is hastily and poorly constructed, and this produces a reluctance to cooperate on the part of many institutions, then institution-based interinstitutional research will have become a burden. To a large degree, the institutional researcher will dictate which of these developments occur.

REFERENCES

Carnegie Council on Policy Studies in Higher Education. A Classification of Institutions of Higher Education. Berkeley: The Carnegie Foundation for the Advancement of Teaching, 1976.

Committee Z on the Economic Status of the Profession. "The Rocky Road through the 1980's: Annual Report on the Economic Status of the Profession, 1980-81." Academe 67 (August 1981): 210-293.

Dressel, Paul L. "Major Problems in Higher Education." In Institutional Research in the University: A Handbook, pp. 1-18. San Francisco: Jossey-Bass Inc., 1972.

_______. "Nature of Institutional Research in Self-Study." In Institutional Research in the University: A Handbook, pp. 19-37. San Francisco: Jossey-Bass Inc., 1972.

Dressel, Paul L. and Sally B. Pratt. "Wider Research." In Institutional Research in the University: A Handbook, pp. 292-308. San Francisco: Jossey-Bass Inc., 1972.

Peterson, Marvin W. "Benefits, Limits, and Continuing Issues." In Benefiting From Interinstitutional Research, pp. 101-107. Edited by Marvin W. Peterson, New Directions for Institutional Research, no. 12. San Francisco: Jossey-Bass Inc., 1976.

_______. "Editor's Notes." In Benefiting From Interinstitutional Research, pp. vii-xii. Edited by Marvin W. Peterson, New Directions for Institutional Research, no. 12. San Francisco: Jossey-Bass Inc., 1976.

Saupe, Joe L. "Collecting and Utilizing Basic Data." In Institutional Research in the University: A Handbook, pp. 53-99. San Francisco: Jossey-Bass Inc., 1972.

Terenzini, Patrick T., Leif Hartmark, Wendell G. Lorang, Jr., and Robert C. Shirley. "A Conceptual and Methodological Approach to the Identification of Peer Institutions." Research in Higher Education 12 (1980): 347-364.

**North
East
Association for
Institutional
Research**

"PLANNING FOR QUALITY"

EIGHTH ANNUAL CONFERENCE
NOVEMBER 5 - 7, 1981

HENRY CHAUNCEY CONFERENCE
CENTER
PRINCETON, NEW JERSEY

Welcome to NEAIR's Eighth Annual Conference. This year's theme is "Planning for Quality", which is precisely what those involved in the groundwork for the Conference have done. This program promises to continue the Association's tradition of presenting two days of stimulating and professionally enriching workshops, panels, symposia, papers and addresses, in a climate conducive to networking and generating or renewing acquaintances from the past and for the future.

As you look through the schedule, it is guaranteed that you will find a presentation or panel of interest in every time slot. Topics range from finances, planning, modelling, and forecasting to admissions, retention, assessment, and outcomes. You are also strongly urged to participate in our professional development workshop on "Critical Issues in Questionnaire Design",with Dr. Sid Micek, to be held on Thursday afternoon. The conference address, to be delivered by Dr. Thomas Green, will explore the conference's theme, and promises to broaden your perspective on the burning issue of QUALITY. The address will follow a social hour and dinner on Thursday evening.

Between sessions on Friday and Saturday, you are encouraged to take advantage of the lovely conference setting. Set on a tract of secluded countryside, the conference center has ponds, streams, and walking paths to explore. The town of Princeton is minutes away, and is simultaneously a colonial village and a center for music, theatre, sporting events, and museums. New York and Philadelphia are also close enough for an evening's entertainment.

So, then, enjoy the climate which NEAIR and the local arrangements folks have fashioned for your stay in Princeton. We hope that the program will meet most if not all of your needs, and that you will find the Association a useful professional resource both for your work and development. We look forward to meeting you at our "Let's Get Acquainted" social event on Thursday evening and throughout the Conference.

Nancy

Nancy Neville
Program Chair

PROGRAM
THURSDAY, NOVEMBER 5, 1981

NOON - 6:30 P.M.

REGISTRATION

1:30 - 4:30 P.M.

CONFERENCE WORKSHOP
(Registration required: $15.)
(West Wing Meeting Room)

CRITICAL ISSUES IN QUESTIONNAIRE DESIGN

Sid Micek, General Session Presenter
Syracuse University

Robert Grose, Small Group Leader
Amherst College

Robert Lay, Small Group Leader
Boston College

Linda Michaels Suskie, Small Group Leader
SUNY - Oswego

Nancy Neville, Discussant
Rochester Institute of Technology

Patrick Terenzini, Discussant
SUNY - Albany

4:00 - 5:30 P.M.

CONFERENCE DEMONSTRATIONS
(These demonstrations will be repeated on Saturday at 10:30. Equipment will be on display in the demonstration/display room throughout the conference.)

TRACK I

(Demonstration/Display Room)

WORD PROCESSING AND IR

Daniel Updegrove
EDUCOM

TRACK II

(West Wing Seminar Room)

MICROCOMPUTERS

Ronald Orcutt
EDUCOM

5:30 - 6:30 P.M.

SOCIAL HOUR
(Lounge)
Cash Bar

6:30 - 7:45 P.M.

DINNER
(Ticket required)
(Dining Room)

8:00 - 9:00 P.M.

CONFERENCE ADDRESS
(Lounge)

CONCEPTS OF EDUCATIONAL QUALITY

Thomas Green
Syracuse University

9:00 - 11:00 P.M.

SOCIAL EVENT - LET'S GET ACQUAINTED
(Lounge)

Newcomers to NEAIR are invited to meet continuing members and officers of the Association. Hosted by NEAIR Steering Committee. Cash Bar.

FRIDAY, NOVEMBER 6, 1981

7:30 - 8:30 A.M.

BREAKFAST
(Ticket required)
(Dining Room)

8:30 - 10:00 A.M.

REGISTRATION
(Lobby)

8:30 - 10:00 A.M.

CONTRIBUTED PAPERS

TRACK I - PLANNING

(Room A/B)

MODERATOR: Hugh Dempsey
St. Vincent College

THE USE OF CROSS-IMPACT MATRIX FOR THE GENERATION OF ACADEMIC PLANNING MODELS
(8:30-9:10)

Edward Jordan
Catholic University

TRACK I (cont'd)

COST STUDY DATA BASES: THE EVOLUTION OF A DECISION SUPPORT SYSTEM-TWO CASE STUDIES
(9:15-10:00)

Claire Hanley
University of Rochester

David Rumpf
UMass-Amherst

Chet Karbowicz
UMass-Amherst

TRACK II - ENROLLMENT

(West Wing Meeting Room)

MODERATOR: Elizabeth Knapp
SUNY - Binghamton

ENROLLMENT PROJECTIONS: A MODEL FOR THE REGIONAL PUBLIC INSTITUTION
(8;30-8:50)

Robert Karp
Kean College of New Jersey

Edward Delaney
Kean College of New Jersey

ESTIMATING FALL ENROLLMENT AND FTE's USING A STUDENT FLOW MODEL
(8:55-9:15)

Louis Spiro
SUNY - Brockport

PREDICTING ENROLLMENTS
(9:20-9:40)

Susan Goodwin
University of Lowell

Winship Fuller
University of Lowell

COMPUTERIZED PROJECTION OF UNDERGRADUATE STUDENT ENROLLMENT AT BOSTON UNIVERSITY
(9:40-10:00)

Carolyn Shettle
Boston University

David Bradley
Boston University

Peter Farago
Boston University

TRACK III - ASSESSMENT

(C/D Barn)

MODERATOR: Robert Grose
Amherst College

THE COMP OF ACT
(8:30-9:15)

Kendy Rudy
Upsala College

Donald Lintvedt
Upsala College

Lois Torrence
University of Connecticut

THE GLOBAL AWARENESS INSTRUMENT OF ETS
(9:20-10:00)

Thomas Barrows
ETS

10:00 - 10:30 A.M.

BREAK

10:30 - NOON

CONFERENCE SYMPOSIUM
(West Wing Meeting Room)

MOVING BEYOND PLANNING BASED ON EXTRAPOLATION IN AN ERA OF RADICAL CHANGE

Donald Hester
NY State Education Department

Paul Wing
NY State Education Department

NOON - 1:45 P.M.

LUNCH
(Ticket required)
(Dining Room)

1:45 - 3:20 P.M.

CONTRIBUTED PAPERS AND PANELS

TRACK I - PLANNING

(A/B Barn)

MODERATOR: Ram Chugh
SUNY - Potsdam

TRACK I (cont'd)

MODELLING IN THE PLANNING PROCESS

Claire Hanley, Coordinator
University of Rochester

John Dunn
Tufts University

Richard Heck
Colgate University

Evangeline Rocha
Brown University

Louis Spiro
SUNY - Brockport

Daniel Updegrove
EDUCOM

TRACK II - OUTCOMES

(West Wing Meeting Room)

MODERATOR: Martin Schwartz
Camden County College

ROLE OF CAREER MATURITY AND LOCUS OF CONTROL IN THE INITIAL EMPLOYMENT OF COLLEGE GRADUATES
(1:45-2:10)

Kathleen Hulbert
University of Lowell

HOW STUDENTS CHANGE: A LONGITUDINAL STUDY
(2:15-2:40)

Diana Green
SUNY - Plattsburgh

Jean Morlock
SUNY - Plattsburgh

Jocile Ward
SUNY - Plattsburgh

DESIGN AND CONDUCT OF AN ALUMNI SURVEY
(2:45-3:10)

Susan Lachman
Kean College of NJ

Edward Delaney
Kean College of NJ

TRACK III - FACULTY AND STAFF

(C/D Barn)

MODERATOR: Helen Wyant
SUNY - Buffalo

TRACK III (cont'd)

INFLUENCES ON SALARY: A NATIONAL SALARY STUDY OF COLLEGE ADMISSIONS OFFICERS
(1:45-2:10)

David Chapman
SUNY - Albany

A MODEL FOR PROJECTING TENURE DENSITY AT THE INSTITUTIONAL LEVEL
(2:15-2:40)

Christos Theophilides
SUNY - Albany

ACADEMIC BURNOUT AS ORGANIZATIONAL DYSFUNCTION: WHO IS TO BLAME?
(2:45-3:10)

C. Stuart Dube'
SUNY - Brockport

3:20 - 3:40 P.M.

BREAK

3:40 - 4:45 P.M.

CONTRIBUTED PAPERS

TRACK I - PROGRAMS AND RETENTION

(A/B Barn)

MODERATOR: Eric Kurtz
Harvard University

STUDENT RETENTION
(3:40-4:00)

Kendy Rudy
Upsala College

Donald Lintvedt
Upsala College

AN EVALUATION OF GRADUATE PROGRAMS AND STUDENT RETENTION
(4:05-4:25)

Louis Spiro
SUNY - Brockport

Jill Campbell
SUNY - Brockport

GRADUATE PROGRAM SELF-ASSESSMENT SERVICE
(4:30-4:50)

Eldon Park
ETS

TRACK II - THE ENVIRONMENT

(West Wing Meeting Room)

MODERATOR: Gail Hogan
Ithaca College

REAGANOMICS AND RESEARCH: INSTITUTIONAL IMPLICATIONS
(3:40-4:00)

John Joyce
Lesley College

Beverly Joyce
Boston College

DEGREE PATTERNS: AN INDICATOR OF INSTITUTIONAL AND SYSTEM RESPONSIVENESS
(4:05-4:25)

Donald Hester
NY State Education Department

MARKETING FOR CONTINUING EDUCATION NEEDS
(4:30-4:50)

Marilynn Draxl
University of Maryland

Melissa Daston
University of Maryland

TRACK III - THE FIELD OF IR

(C/D Barn)

MODERATOR: Helen Gradisar
Carlow College

IR WITHOUT A COMPUTER: COLLECTION ASSIMILATION AND APPLICATION OF STUDENT CHARACTERISTICS DATA
(3:40-4:00)

Kathleen O'Rielly
Davis and Elkins College

SPECIFIC PURPOSE INTER-INSTITUTIONAL RESEARCH: BOON OR BURDEN?
(4:05-4:25)

Dwight Wolf
Union College

IR AND ACCREDITATION AT THE DEFENSE INTELLIGENCE SCHOOL
(4:30-4:50)

Hugo Keesing
Defense Intelligence School

5:00 - 5:45 P.M.

NEAIR ANNUAL BUSINESS MEETING
(West Wing Meeting Room)

PRESIDING: Patrick T. Terenzini, President
1980-81

ALL MEMBERS ARE URGED TO ATTEND!

Election of officers, future conference site selections, other Association concerns are among the business items which will be covered. Participate in the future of your Association!

5:45 - ?

SOCIAL EVENING

Events and attractions guides are available through the Local Arrangements Committee in the Demonstration/Display Room.

NO MEALS WILL BE AVAILABLE AT THE CONFERENCE CENTER

EFPM users will meet with Dan Updegrove

SATURDAY, NOVEMBER 7, 1981

7:30 - 8:30 A.M.

BREAKFAST
(Ticket required)
(Dining Room)

The 1980-81 and 1981-82 Steering Committees will breakfast together

8:30 - 10:00 A.M.

CONTRIBUTED PAPERS AND PANELS

TRACK I - ADMISSIONS

(A/B Barn)

MODERATOR: Marjorie Raab
Nassau Community College

COLLEGE PREFERENCE PATTERNS OF HIGH SCHOOL SENIORS
(8:30-8:55)

Glenwood Rowse
NY State Education Department

DEVELOPMENT OF A LONGITUDINAL STUDY DATA BANK: ENTERING STUDENT PROFILES
(9:00-9:25)

Edward Delaney
Kean College of NJ

TRACK I (cont'd)

FROM INQUIRY TO APPLICANT: STUDIES AT TWO UNIVERSITIES
(9:30-9:55)

Robert Lay
Boston College

David Bradley
Boston University

TRACK II - THE FIELD OF IR

(C/D Barn)

MODERATOR: Judith Dozier Hackman
Yale University

SHORT SCOPE OR LONG-RANGE IR: A DILEMMA
(8:30-10:00)

Marilyn Draxl, Coordinator
University of Maryland

Hugo Keesing
Defense Intelligence School

Stuart Rich
Georgetown University

Jane Faulman
Northern Virginia Community College

Sylvia Stewart
University of Maryland

TRACK III - TWO AND FOUR YEAR ARTICULATION

(West Wing Meeting Room)

TRANSFER ARTICULATION: RESEARCH DESIGNS FOR FOLLOW-UP STUDIES
(8:30-10:00)

J. Scott Drakulich, Coordinator
Essex County College

Madan Capoor
Middlesex County College

Lewis Dars
NJ Department of Higher Ed

Carl Feigenbaum
Monmouth College

Donald Oppenhein
Rutgers University

10:00 - 10:30 A.M.

BREAK

10:30 - NOON

CONTRIBUTED PAPERS AND DEMONSTRATIONS

TRACK I - COMPUTER GRAPHICS

(C/D Barn)

COMPUTER GRAPHICS APPLICATIONS IN IR
(10:30-Noon)

Ami Meganathan
Carnegie-Mellon University

TRACK II - PLANNING

(West Wing Meeting Room)

MODERATOR: Richard Pattenaude
SUNY - Binghamton

STRATEGIC PLANNING FOR THE ENHANCEMENT OF QUALITY IN AN ERA OF SCARCE RESOURCES: BETTER WITH LESS
(10:30-11:00)

C. Stuart Dube'
SUNY - Brockport

Albert Brown
SUNY - Brockport

THE ROLE AND SCOPE OF IR IN STATE UNIVERSITY PLANNING AND BUDGETING
(11:05-11:35)

Thomas Freeman
SUNY Central Administration

Kathleen Kopf
SUNY Central Adminsitration

TRACK III - DEMONSTRATIONS

WORD PROCESSING AND IR
(A/B Barn)

Daniel Updegrove
EDUCOM

MICROCOMPUTERS
(Demonstration/Display Room)

Ronald Orcutt
EDUCOM

* PLEASE REMEMBER TO COMPLETE THE EVALUATION FORM BEFORE YOU LEAVE THE CONFERENCE

1980 NEAIR STEERING COMMITTEE

PRESIDENT:	Patrick T. Terenzini SUNY - Albany
SECRETARY AND PUBLICATIONS CHAIR:	Diana M. Green SUNY - Plattsburgh
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MEMBERS-AT-LARGE:	Roger Anderson (to 3/81) Allegany Community College
	Carl Feigenbaum Monmouth College
	Elizabeth Knapp SUNY - Binghamton
	Robert Lay Boston College
	Nancy Neville Rochester Inst. of Tech.
	David Rumpf UMass-Amherst
	Simeon Slovacek (to 9/81) California State U at LA
	Paul Wing NY State Ed Department
PAST PRESIDENT AND NOMINATING COMMITTEE CHAIR:	Robert Grose Amherst College
CONFERENCE PROGRAM CHAIR:	Nancy Neville Rochester Inst. of Tech.
CONFERENCE LOCAL ARRANGEMENTS COMMITTEE	Edward Delaney, Co-Chair Kean College of NJ
	Carl Feigenbaum, Co-Chair Monmouth College
CONFERENCE WORKSHOP COORDINATOR	Robert Lay Boston College

North
East
Association for
Institutional
Research

The logo and symbol of NEAIR were conceived and executed by Sharon Heyenck, M.S. in Communication Design, Rochester Institute of Technology. It symbolizes the affiliation of NEAIR with the international Association for Institutional Research, the networking and cooperation which the Association supports, and the flow of information in and out of an IR office. The north east quadrant is highlighted to emphasize the close relationships among IR professionals in that area, and their formal association.